Saint-Laurent Vision 2000

INDUSTRIAL PLANTS

Highlights

FACT SHEET 51

BICC Cables Canada Inc.

500 Mailloux Boulevard
Rivière-Malbaie, Quebec
G5A 1N4

A list of 106 industrial plants has been established under St. Lawrence Vision 2000 (SLV 2000), the second phase of the St. Lawrence Action Plan (SLAP), launched in 1988. The overall objective is to reduce toxic effluent and virtually eliminate discharges of persistent toxic substances.

The 106 industrial plants designated under SLV 2000 are divided into four groups, each with a specific objective. The BICC CABLES CANADA INC. plant in Rivière-Malbaie is in Group 1, comprising plants that discharge inadequately treated effluent.

The objective for Group 1 is to reduce toxic effluent discharges in targeted plants by 90%.

INDUSTRIAL PLANT

Aluminum and steel cable manufacturing

The BICC CABLES CANADA INC. plant in Rivière-Malbaie manufactures cable and metal strip from steel wire and aluminum rods. Steel cable is made by twisting steel wire together to make stranded wire. Aluminum cable is manufactured in two stages: aluminum wire is drawn to the desired thickness and then the strands are twisted together. The drawing takes place in an oil-lubricated tungsten carbide die. The cable is then cleaned with solvent. Aluminum strip, manufactured from rods, is first rolled to the desired diameter and then flat rolled to produce a rectangular strip. Cutting oil is used for the rod rolling and flat rolling. Annual production capacity of the plant is 16 363 t of cable and metal strip. In 1997, the plant operated at 73% capacity and employed a work force of 76.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Aluminum rods
- Steel wire
- Lubricating oils
- Solvents

FINISHED PRODUCTS

- Steel cable
- Aluminum electrical cable (with or without steel reinforcement)
- Aluminum strip

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500 Mailloux Boulevard
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PRODUCTION

PRINCIPAL RAW MATERIALS

- Aluminum rods
- Steel wire
- Lubricating oils
- Solvents

FINISHED PRODUCTS

- Steel cable
- Aluminum electrical cable (with or without steel reinforcement)
- Aluminum strip

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

Low charges

The flowrates and loads measured in 1985 under the Water Cleanup Program (PAE) were used to determine the characteristics of effluent in 1993. Loads for 1993 come from 1985 data adjusted with 1993 flowrate (54 m^3/d). Based on this, in 1993 the plant discharged 54 m^3/d of effluent containing notably:

- 5.77 kg/d of suspended solids (SS)
- 2.92 kg/d of chemical oxygen demand (COD)
- 0.48 kg/d of oil and grease (O&G)
- 0.31 kg/d of biochemical oxygen demand (BOD_5)
- 0.11 kg/d of aluminum
- 0.03 kg/d of iron

RESOURCES AND USES TO PRESERVE

Salmon restocked

The BICC CABLES CANADA INC. plant in Rivière-Malbaie empties effluent into the Malbaie River, home to eight species of fish. The most abundant species are longnose dace, brook trout, white sucker and longnose sucker. The rest of the fish population is composed of threespine stickleback, sculpin, lamprey and recently, Atlantic salmon. Atlantic salmon once spawned in the Malbaie River but were driven away by poor water quality.

In addition, until 1986, Donohue ran logs on the river; these backed up behind a dam built above Clermont Falls, posing another obstacle to the salmon run. The Ministère de l'Environnement et de la Faune du Québec (MEF) has been releasing parrs into the river since 1992 and the first salmon run occured in 1996. In 1997, there was a salmon run of 400 adults; they were able to cross the Donohue Forest Products Inc. dam through a fishway installed by that company. It will be permitted to fish for salmon in a small portion of the river beginning in 1998.

There are at least seven species of fish in the coastal waters between Cap-à-l'Aigle and Pointe-au-Pic, the most abundant being capelin and rainbow smelt.

Recreational facilities between Clermont and the mouth of the river consist of only a few campgrounds.

Although the river is accessible to anglers, swimmers and canoeists, poor water quality discourages recreational activities. The bay is nonetheless used in summer by windsurfers and pleasure boaters. It is also possible to fish for smelt on either side of the bay, from the wharves of Cap-à-l'Aigle and Pointe-au-Pic. The bay is no longer used for commercial fishing or shellfish harvesting, as it was in the past.

ENVIRONMENTAL DISCHARGE OBJECTIVES

Environmental protection

Environmental discharge objectives are established to preserve local resources and uses. These guidelines, expressed as maximum permissible loads and concentrations for effluent released into the environment, are used in choosing treatment methods which best promote environmental protection. Environmental discharge objectives for BICC CABLES CANADA INC. have been calculated and are available on request.

EFFLUENT TREATMENT

No industrial wastewater

The plant does not discharge any industrial wastewater. The soluble oils used for lubrication are recirculated and then disposed of as hazardous waste; they are removed by an authorized carrier. Blowdown from the cooling towers, heat exchangers and boilers goes directly into the effluent. Domestic sewage is channelled into two septic tanks; overflows from these tanks empty into the Malbaie River via the main outfall and a drain located at the east end of the plant.

PREVENTION AND CLEANUP MEASURES IMPLEMENTED

Prevention measures

Since 1993, the company had effected a better management of their equipment and has obstructed floor drains at the sectors most vulnerable to spills or leaks of petroleum products.

REGULATORY COMPLIANCE - WATER COMPONENT

No discharge standards

The BICC CABLES CANADA INC. plant is not subject to any discharge standards.

POLLUTION ABATEMENT

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

Low Chimiotox index

The Chimiotox index gauges the load of all toxic substances in industrial effluent using toxicity factors assigned to each contaminant. It is used, among other things, to monitor discharge trends over the years (Figure 1) and determine the toxic contribution of each pollutant (Table 1).

Table 1 gives SLV 2000 characterization data collected in September 1995 along with the Chimiotox values calculated from them, assuming an effluent flowrate of 22.5 m^3/d. Nine substances were selected in testing for more than 120. The Chimiotox index obtained using these data was among the lowest of those of the 106 SLV 2000 priority plants.

Figure 1 is plotted from 1995 SLV 2000 characterization data. The Chimiotox index calculated from these data was reported unchanged for 1993 to 1998, since no major process changes were made during this period.

Table 1 ***Chimiotox Index (1995) - BICC Cables Canada Inc.****

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
Total oil and grease	0.072	100	7
Total arsenic	4.87×10^{-5}	57 143	3
Total phosphorus	0.020	50	1
Total copper	0.003	451	1
Total aluminium	0.004	11	<1
Total iron	0.011	3.3	<1
Total manganese	2.637×10^{-4} **	10	<1
Total vanadium	0.001 **	71	<1
Total zinc	0.005	9.4	<1
CHIMIOTOX INDEX			**14**

* Assuming an effluent flowrate of 22.5 m^3/d (nine substances selected in testing for more than 120)

** Load calculation based on analytical data which are near methodological detection limits

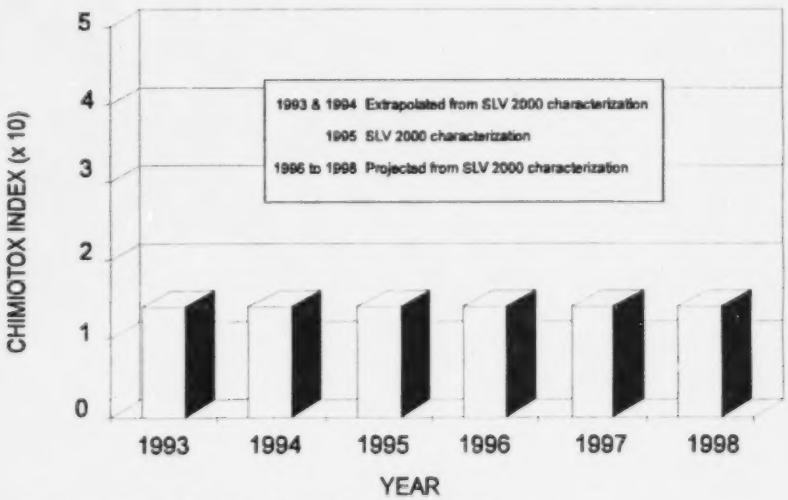

Figure 1 ***Chimiotox Index Trends (1993 to 1998) BICC Cables Canada Inc.***

VIRTUAL ELIMINATION OF PERSISTENT TOXIC SUBSTANCES

One long-range objective of SLV 2000 is the virtual elimination of eleven persistent and bioaccumulative toxic substances from the effluent of 106 priority plants along the St. Lawrence and its tributaries. The targeted substances are those designated by the International Joint Commission in August 1993: PCBs, DDT, dieldrin, toxaphene, dioxins, furans, mirex, mercury, lead alkyls, benzo(*a*)pyrene and hexachlorobenzene. To reach this objective, Protection has fixed the environmental discharge objectives set for applicable substances as its target by the end of SLV 2000 in 1998, thereby ensuring that all uses of the receiving environment are protected.

None of these persistent bioaccumulative toxic substances were detected during the 1995 SLV 2000 characterization.

PEEP TOXICITY REDUCTION

Non-toxic effluent

The Potential Ecotoxic Effects Probe (PEEP) combines the results of six standardized bioassays measuring the toxic effects of effluent. Results are expressed on a logarithmic scale of increasing toxicity ranging from 1 to 10 and are used to monitor discharge trends over the years. In the case of the BICC CABLES CANADA INC. plant in Rivière-Malbaie, a series of bioassays was conducted in 1995, yielding a PEEP of 0.05, and showing no toxicity for the organisms tested.

REDUCTION IN SUBSTANCES MONITORED

Reductions through prevention

According to the most recent data (1995 SLV 2000 characterization data), the plant discharges an average of 22.5 m^3/d of effluent, containing notably:

- 1.89 kg/d of chemical oxygen demand (COD)
- 0.55 kg/d of biochemical oxygen demand (BOD_5)
- 0.13 kg/d of suspended solids (SS)
- 0.07 kg/d of oil and grease (O&G)
- 0.01 kg/d of iron

Between 1993 and 1995, effluent flowrate decreased by 59%. Aluminum, suspended solids and oil and grease also fell. These decreases are due to better equipment management and the blocking of floor drains in the sectors most vulnerable to spills or leaks of petroleum products.

KEY POINTS

- **One of the lowest Chimiotox indexes among SLV 2000 plants**
- **Non-toxic effluent**

Information revised January 1998

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Saint-Laurent Vision 2000

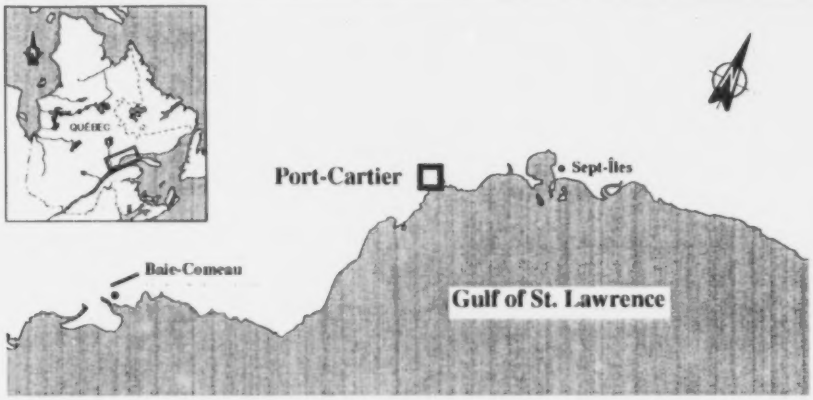
INDUSTRIAL PLANTS

Highlights

FACT SHEET 52

Quebec Cartier Mining

Highway 138
Port Cartier, Quebec
G5B 2H3



A list of 106 industrial plants has been established under St. Lawrence Vision 2000 (SLV 2000), the second phase of the St. Lawrence Action Plan, launched in 1988. The overall objective is to reduce toxic effluent and virtually eliminate discharges of persistent toxic substances.

The 106 industrial plants designated under SLV 2000 are divided into four groups, each with a specific objective. The QUEBEC CARTIER MINING works in Port Cartier is in Group 1, comprising industrial plants that discharge inadequately treated effluent.

The objective for Group 1 is to reduce toxic effluent discharges in targeted plants by 90%.

INDUSTRIAL PLANT

Pellet plant and port facilities

QUEBEC CARTIER MINING operates an iron mine at Mount Wright, 400 km north of Port Cartier. Concentrate produced in the concentrator is transported by train to the port facilities at Port Cartier. There the concentrate is unloaded and carried to storage areas, loaded onto ships or taken to the pellet plant. About half of the concentrate from Mount Wright (8 000 000 t/yr) is made into pellets in the plant before shipping. The concentrate, to which water and coal has been added, is ground to a fine powder in ball mills. Bentonite and dolomite are added to the slurry to form a damp paste and the mixture is formed into pellets in balling discs. The low-silicon pellets are enriched before being formed into pellets. Once formed, the pellets are dried, cooked and cooled in two indurating machines then sent to storage areas or ship-loading docks. In 1997, the port facilities handled close to 16 000 000 t of concentrate and pellets, and the plant operated at 91% design capacity. The company employs a total work force of 2100.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Iron concentrate
- Dolomite
- Coal (coke)
- Limestone
- Bentonite
- Oil

FINISHED PRODUCTS

- Blast furnace pellets
- Self-melting pellets
- Low-silicon pellets
- Self-melting low-silicon pellets

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

Iron present

Based on company data, in 1993 QUEBEC CARTIER MINING discharged about 28 400 m^3/d of effluent, containing notably:

- 3697 kg/d of suspended solids (SS)
- 1495 kg/d of iron
- 3.8 kg/d of mineral oil and grease (O&G)

RESOURCES AND USES TO PRESERVE

Characteristics of Port Cartier area

Effluent from QUEBEC CARTIER MINING flows into the Gulf of St. Lawrence. There is commercial fishing around Port Cartier. Snow crab, herring, turbot, whelk, Stimpson's surf clam, smelt, cod, sole, lumpfish and lobster are fished. An underharvested species, capelin, is abundant in Cayes Noires Bay. Marine mammals found in the area include harbour porpoise, minke whale, finback whale, grey seal and harp seal. Sport fishing for Atlantic salmon is mainly confined to the Rochers River. There is one beach southeast of McCormick Island and another to the east; there is also swimming in Grande Baie. Commercial and pleasure boats sail on the gulf off Port Cartier. Riverside parks in the area feature lookouts, trails, a public beach and a viewpoint at the foot of the falls. There is a campground on the east bank at the mouth of the Dominique River.

ENVIRONMENTAL DISCHARGE OBJECTIVES

Environmental protection

Environmental discharge objectives are established to preserve local resources and uses. These guidelines, expressed as maximum permissible loads and concentrations for effluent released into the environment, are used in choosing treatment methods which best promote environmental protection. Environmental discharge objectives for QUEBEC CARTIER MINING have been calculated and are available on request.

EFFLUENT TREATMENT

Raw material recovery

Industrial wastewater from the pellet plant flows through three thickeners. Raw materials are recovered and re-introduced into the process. Domestic sewage from the pellet plant is treated by aerobic digestion followed by addition of chlorine. Wastewater from the port facilities are allowed to settle out before it is discharged.

PREVENTION AND CLEANUP MEASURES IMPLEMENTED

Water management plan

In 1990, the company hired a firm of consultants to develop a Master Plan for managing of red water in the Port Cartier area; the goal was to draw up a wastewater inventory and propose alternate solutions that would allow compliance with environmental requirements. An action plan was implemented beginning in 1994 to reduce wastewater discharges into the Gulf of St. Lawrence. This included enlarging the tailings area, which would have the effect of sending thickening water to a polishing lagoon. This work was completed in 1995. Measures are currently being taken to allow water recirculation, and ditches and piping will be installed to collect runoff, which will be treated and then recirculated. The program calls for the company to monitor cleanup measures, and acquire more effluent treatment know-how. The cost of activities under the Master Plan will total about $5.5 million.

The company has also arranged a storage area for raw materials. This facility includes dividing walls, a rotary conveyor and a drainage ditch linked to a settling tank which recovers and treats runoff containing raw materials. The cost of the installation was $2.2 million.

REGULATORY COMPLIANCE - WATER COMPONENT

No specific regulations

The QUEBEC CARTIER MINING works in Port Cartier is not subject to any specific regulations governing effluent.

POLLUTION ABATEMENT

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

Mainly total arsenic

The Chimiotox index gauges the load of all toxic substances in industrial effluent using toxicity factors assigned to each contaminant. It is used, among other things, to monitor discharge trends over the years (Figure 1) and determine the toxic contribution of each pollutant (Table 1).

Table 1 gives data from the October 1995 SLV 2000 characterization along with the Chimiotox values calculated from them, assuming an effluent flowrate of 19 157 m^3/d. Fourteen substances were selected in testing for more than 120. Based on these data, total arsenic accounts for 36% of the Chimiotox index, followed by total iron with 35%.

Figure 1 is plotted from 1995 SLV 2000 characterization data. The Chimiotox index calculated from the 1995 data was reported unchanged for 1996 to 1998. For 1993 and 1994, the Chimiotox index was modified to take into account the concentration of iron in the effluent. A number of changes were made in 1994 and 1995 to reduce pollutant discharges from the industrial complex.

Table 1 ***Chimiotox Index (1995) - Quebec Cartier Mining****

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
Total arsenic	0.045	57 143	2 545
Total iron	748.317	3.3	2 469
Total sulphides	1.565	500	783
Total copper	1.227	451	553
Mineral oil and grease	3.653	100	365
Total chromium	0.166	500	83
Total aluminum	6.408	11	70
Total phosphorus	1.050	50	53
Nitrites-nitrates	9.033	5	45
Total cyanides	0.095 **	200	19
Total manganese	1.807	10	18
Total zinc	1.728	9.4	16
Total selenium	0.040	200	8
Ammonia nitrogen	3.062	0.8	2
CHIMIOTOX INDEX			**7 029**

* Assuming an effluent flowrate of 19 157 m^3/d (14 substances selected in testing for more than 120).

** Load calculation based on analytical data which are near methodological detection limits.

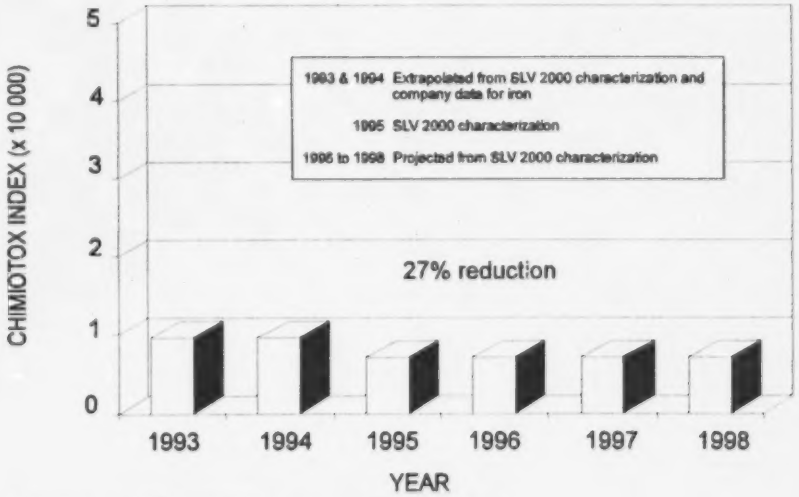


Figure 1 ***Chimiotox Index Trends (1993 to 1998) Quebec Cartier Mining***

VIRTUAL ELIMINATION OF PERSISTENT TOXIC SUBSTANCES

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Based on 1995 SLV 2000 characterization data, none of these eleven persistent and bioaccumulative toxic substances was detected in the company's effluent.

PEEP TOXICITY REDUCTION

Non-toxic effluent

The Potential Ecotoxic Effects Probe (PEEP) combines the results of six standardized bioassays measuring the toxic effects of effluent. Results are expressed on a logarithmic scale of increasing toxicity ranging from 1 to 10 and are used to monitor discharge trends over the years. In the case of the QUEBEC CARTIER MINING facilities, a series of bioassays was carried out in 1995; yielding a PEEP value of less than 1.7, and showing no toxicity for the organisms tested.

REDUCTION IN SUBSTANCES MONITORED

Decrease in iron load

According to company data, in 1995 QUEBEC CARTIER MINING discharged 19 157 m^3/d of effluent, containing notably:

- 3999 kg/d of suspended solids (SS)
- 754 kg/d of iron
- 3.7 kg/d of mineral oil and grease (O&G)

From 1993 to 1995, the effluent flowrate decreased by 33% and the iron load by 50%; suspended solids and oil and grease loads remained stable. The reductions were due to cleanup measures implemented in 1994 and 1995.

KEY POINTS

- **Preparation of a wastewater management plan and implementation of a five-year action plan at a cost of $5.5 million**
- **Raw material storage area created at a cost of $2.2 million**
- **Non-toxic effluent and 27% Chimiotox reduction**

Information revised January 1998

ADDITIONAL INFORMATION

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(514) 283-3452

Environmental discharge objectives:
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Sylvie Roberge Marc Villeneuve

Ministère de l'Environnement et de la Faune du Québec
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Saint-Laurent Vision 2000

INDUSTRIAL PLANTS

Highlights

FACT SHEET 53

Sal-Tan Leather Inc.

271 route Notre-Dame Nord
Louiseville, Quebec
J5V 2L6

A list of 106 industrial plants has been established under St. Lawrence Vision 2000 (SLV 2000), the second phase of the St. Lawrence Action Plan, launched in 1988. The overall objective is to reduce toxic effluent and virtually eliminate discharges of persistent toxic substances.

The 106 industrial plants designated under SLV 2000 are divided into four groups, each with a specific objective. The SAL-TAN LEATHER INC. tannery in Louiseville is in Group 1, comprising plants that discharge inadequately treated effluent.

The objective for Group 1 is to reduce toxic effluent discharges in targeted plants by 90%.

INDUSTRIAL PLANT

Tannery

The SAL-TAN LEATHER INC. tannery in Louiseville prepares sheepskins for garment manufacturing and cowhides for furniture production. Sheepskin treatment processing includes retanning and dying, drying, softening, conditioning and finishing. The hides are then graded, measured and shipped. Semi-finished cowhides are softened, conditioned and finished, then graded, measured and shipped. Annual production capacity of the plant is 930 000 m^2. In 1997, the plant operated at 80% design capacity and employed a work force of 115.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Tanned sheepskins
- Semi-finished cowhides
- Colourings
- Retanning products
- Lacs
- Pigments

FINISHED PRODUCTS

- Sheepskins for garment manufacturing
- Cowhide for furniture

Saint-Laurent

INDUSTRIAL PLANTS
Highlights

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PRODUCTION

PRINCIPAL RAW MATERIALS

- Tanned sheepskins
- Semi-finished cowhides
- Colourings
- Retanning products
- Lacs
- Pigments

FINISHED PRODUCTS

- Sheepskins for garment manufacturing
- Cowhide for furniture

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

Mainly BOD_5

Only 1995 SLV 2000 characterization data are available. Based on these results, the plant had an effluent discharge of about 180 m^3/d into the river, containing notably:

- 110 kg/d of biochemical oxygen demand (BOD_5)
- 35.3 kg/ of oil and grease (O&G)
- 5.8 kg/d of suspended solids (SS)
- 1.2 kg/d of chromium

RESOURCES AND USES TO PRESERVE

Boating activities

Beginning April 1998, wastewater from the SAL-TAN LEATHER INC. tannery will be pretreated at the plant and then treated at the Louiseville wastewater treatment plant before being discharged into the du Loup River about 4 km from its mouth. Water sports and pleasure boating are popular on this river in the vicinity of Louiseville. The area is also a cottaging site. A marina as well as private wharves and boat-ramps are located upstream from the discharge point. A number of fish species, including eels, swim upriver. The area is popular with fishing enthusiasts who catch pike and walleye, among other species of fish.

ENVIRONMENTAL DISCHARGE OBJECTIVES

Environmental protection

Environmental discharge objectives are established to preserve local resources and uses. These guidelines, expressed as maximum permissible loads and concentrations for effluent released into the environment, are used in choosing treatment methods which best promote environmental protection. There are no environmental discharge objectives for SAL-TAN LEATHER INC. since effluent from the tannery will be sent to the municipal wastewater treatment plant beginning April 1998.

EFFLUENT TREATMENT

Pretreatment and connection to municipal wastewater plant

Industrial wastewater is pretreated at the plant and the effluent will soon be sent to the Louiseville wastewater treatment plant. More specifically, industrial wastewater is screened to eliminate suspended solids. Beginning April 1998, it will pass through a dechroming treatment, including neutralization, coagulation, flocculation and finally tangential sedimentation. Domestic wastewater and runoff from the property and roofs are discharged untreated into the municipal sewer system.

PREVENTION AND CLEANUP MEASURES IMPLEMENTED

Connection to municipal wastewater treatment plant

On December 17, 1993, the company signed an agreement with Louiseville for wastewater treatment. Beginning April 1998, the plant will be connected to the municipal sewer system and wastewater will be sent to the Louiseville wastewater treatment plant (aerated lagoons).

The pretreatment system, including a degreasing and dechroming unit, was installed in 1997 and will be in operation in April 1998.

Modernization of equipment and manufacturing processes is also planned in 1998. The proposed changes will reduce hydraulic and organic loads.

REGULATORY COMPLIANCE - WATER COMPONENT

CA renegotiation

SAL-TAN LEATHER INC. is preparing to apply for authorization to change the standards in its existing certificate of authorization. These standards no longer correspond to the company's operations. Effluent should meet the standards of the agreement with the municipality of Louiseville.

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

Mainly oil and grease

The Chimiotox index gauges the load of all toxic substances in industrial effluent using the toxicity factors assigned to each contaminant. It is used, among other things, to monitor discharge trends over the years (Figure 1) and determine the toxic contribution of each pollutant (Table 1).

Table 1 gives data from the September 1995 SLV 2000 characterization along with the Chimiotox values calculated from them, assuming an effluent flowrate of 180 m^3/d. Twelve substances were selected in testing for more than 120. Based on these data, total oil and grease accounts for 76% of the Chimiotox index, followed by total chromium with 13%.

Figure 1 is plotted from 1995 SLV 2000 characterization data. The Chimiotox index calculated from these data was applied to the years 1993 to 1997. Projections for 1998 are based on SLV 2000 characterization data adjusted for the efficiency of the municipal wastewater treatment system.

Table 1 ***Chimiotox Index (1995) - Sal-Tan Leather Inc.****

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
Total oil and grease	35.250	100	3 525
Total chromium	1.228	500	614
Dibenzo(*a,h*)anthracene	0.002 **	100 000	245
Total sulphides	0.339	500	170
Total beryllium	0.003 **	15 601	40
Total copper	0.021	451	9
Total phosphorus	0.054	50	3
Total iron	0.777	3.3	3
Ammonia nitrogen	2.733	0.8	2
Total cadmium	0.003 **	909	2
Total cyanides	0.007 **	200	1
Total aluminum	0.093	11	1
CHIMIOTOX INDEX			**4615**

* Assuming an effluent flowrate of 180 m^3/d (12 substances selected in testing for more than 120).

** Load calculation based on analytical data which are near methodological detection limits.

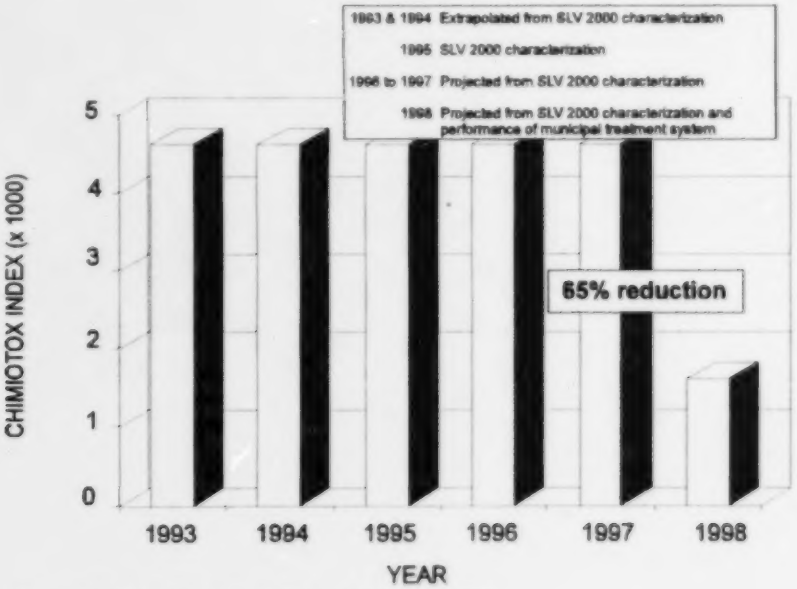

Figure 1 ***Chimiotox Index Trends (1993 to 1998) Sal-Tan Leather Inc.***

VIRTUAL ELIMINATION OF PERSISTENT TOXIC SUBSTANCES

One long-range objective of SLV 2000 is the virtual elimination of eleven persistent and bioaccumulative toxic substances from the effluent of 106 priority plants along the St. Lawrence and its tributaries. The targeted substances are those designated by the International Joint Commission in August 1993: PCBs, DDT, dieldrin, toxaphene, dioxins, furans, mirex, mercury, lead alkyls, benzo(*a*)pyrene and hexachlorobenzene. To reach this objective, Protection has fixed the environmental discharge objectives set for applicable substances as its target by the end of SLV 2000 in 1998, thereby ensuring that all uses of the receiving environment are protected.

Based on 1995 SLV 2000 characterization data, none of these eleven persistent bioaccumulative toxic substances was detected in the company's effluent.

PEEP TOXICITY REDUCTION

Moderate PEEP

The Potential Ecotoxic Effects Probe (PEEP) combines the results of six standardized bioassays measuring the toxic effects of effluent. Results are expressed on a logarithmic scale of increasing toxicity ranging from 1 to 10 and are used to monitor discharge trends over the years. In the case of the SAL-TAN LEATHER INC. tannery, a series of bioassays was carried out in 1995, yielding a PEEP value of 4.4, which is moderate.

REDUCTION IN SUBSTANCES MONITORED

Reduction in chromium

SLV 2000 characterization data remain the most recent figure available. Nevertheless, beginning April 1998, industrial wastewater will be pretreated at the plant and subsequently treated at the municipal wastewater treatment plant, thereby reducing discharges, in particular chromium.

KEY POINTS

- **65% reduction in Chimiotox index expected as of April 1998**
- **Process modernization and installation of wastewater pretreatment system in 1997 and 1998**
- **Connection to Louiseville wastewater treatment plant in April 1998**

Information revised January 1998

ADDITIONAL INFORMATION

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Saint-Laurent Vision 2000

INDUSTRIAL PLANTS

Highlights

FACT SHEET 54

ICI Canada Inc.

Des Érables Street
Brownsburg Complex
Brownsburg, Quebec
J0V 1A0

A list of 106 industrial plants has been established under St. Lawrence Vision 2000 (SLV 2000), the second phase of the St. Lawrence Action Plan, launched in 1988. The overall objective is to reduce toxic effluent and virtually eliminate discharges of persistent toxic substances.

The 106 industrial plants designated under SLV 2000 are divided into four groups, each with a specific objective. The ICI CANADA INC. plant in Brownsburg is in Group 1, comprising plants that discharge inadequately treated effluent.

The objective for Group 1 is to reduce toxic effluent discharges in targeted plants by 90%.

INDUSTRIAL PLANT

Manufacture of explosives initiating systems

The ICI CANADA INC. plant in Brownsburg manufactures explosives initiating systems and their components. The principal processes are metal shell production, plastic shock tube extrusion, pyrotechnic powder preparation, lead azide manufacture, processing/handling of pyrotechnic powder and explosives, and assembly and packaging of finished products. The main plant occupies about 90 acres and the total site is about 1600 acres. In 1997, the site employed a work force of 455 people, including Production, Research and Development, and Sales.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Aluminum
- Lead
- Lead nitrate
- HMX
- Copper
- Sodium azide
- PETN
- Plastic parts
- Plastic resins
- Corrugated cardboard boxes

FINISHED PRODUCTS

- Detonator assemblies
- Shock tubes
- Pyrotechnic-powder tubes
- Aluminum tubes
- Copper tubes

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

Mainly COD

Since there are no data for 1993, the SLV characterization data were used. According to these data, the plant discharged about 132 m^3/d of effluent, containing notably:

- 139 kg/d of chemical oxygen demand (COD)
- 24.9 kg/d of total oil and grease (O&G)
- 16.2 kg/d of suspended solids (SS)
- 12 kg/d of biochemical oxygen demand (BOD_5)

RESOURCES AND USES TO PRESERVE

Abundant aquatic life

ICI CANADA INC. had facilities at two sites in Brownsburg (the La Branche site and the Principal site), one on either side of the de l'Ouest River. Since November 1995, however, there has been no manufacturing at the La Branche site. The river upstream of the discharge point attracts tourists. Anglers fish for more than a dozen fish species; the most sought after are brown trout, bass, brook trout, muskellunge and walleye. Aquatic life is also abundant downstream. The mouths of several streams and of the de l'Ouest River are considered favourable sites for spawning of trout and yellow walleye. The lakes upstream of Brownsburg are suitable for water activities such as pleasure boating and line fishing. The first drinking water intake downstream of the discharge point supplies the town of Deux-Montagnes, at the southern end of Lac des Deux Montagnes.

ENVIRONMENTAL DISCHARGE OBJECTIVES

Environmental protection

Environmental discharge objectives are established to preserve local resources and uses. These guidelines, expressed as maximum permissible loads and concentrations for effluent released into the environment, are used in choosing treatment methods which best promote environmental protection. There are no environmental discharge objectives for ICI CANADA INC. as the company will send its wastewater to the future municipal treatment plant once it is in operation.

EFFLUENT TREATMENT

Three treatment units

The ICI CANADA INC. facilities include three units for treating industrial effluent. The first, in building 200, removes lead azide and sodium azide in five mixing tanks using sodium nitrite and nitric acid. The water is then channelled to building 532, which also receives effluent loaded with metals, effluent from a maintenance area and effluent generated by the preparation of pyrotechnic powder. The treatment system comprises an agitated storage tank, an oil recovery tank, a three-compartment Thermonic metal-removal unit, a holding tank and three paper filters. A third treatment system, in building 600G, includes a settling tank for water from screening and washing explosive products. Direct cooling water is recirculated. Domestic sewage is released directly into the de l'Ouest River.

PREVENTION AND CLEANUP MEASURES IMPLEMENTED

Treatment system improvement

A number of manufacturing processes have been discontinued since 1992. The plant has not produced lead styphnate since the end of 1992. The facilities for manufacturing thermalite, safety fuses and connectors were shut down between June and December 1993, and the buildings were dismantled. The chrome plating facility closed in June 1994. The raw materials used to manufacture pyrotechnic powder (barium chromate and lead chromate) have been replaced. The plant stopped making detonating cord in November 1995.

THE ICI CANADA INC. plant improved its wastewater treatment system in 1997 and will make lead removal improvements in 1998. The company continue to search for a system adapted to oil and grease removal which will be in operation in 1999. The company is also studying the possibility of sending industrial effluent and domestic sewage to the future municipal wastewater treatment plant (aerated lagoons).

REGULATORY COMPLIANCE - WATER COMPONENT

No specific regulations

The ICI CANADA INC. plant is not subject to any specific regulations governing industrial effluent. After the connection to the Brownsburg wastewater treatment plant, the company will be subject to the discharge standards established by the MEF and the municipality under a water cleanup program (PAE).

POLLUTION ABATEMENT

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

Mainly total oil and grease

The Chimiotox index gauges the load of all toxic substances in industrial effluent using toxicity factors assigned to each contaminant. It is used, among other things, to monitor discharge trends over the years (Figure 1) and determine the toxic contribution of each pollutant (Table 1).

Table 1 gives SLV 2000 characterization data collected in July 1995 along with the Chimiotox values calculated from them, assuming an effluent flowrate of 132 m^3/d. Eleven substances were selected in testing for more than 120. According to these data, total oil and grease dominate the treated effluent, accounting for 64% of the Chimiotox index.

Figure 1 is plotted from 1995 SLV 2000 characterization data. The Chimiotox index calculated from these data was reported unchanged for 1993, 1994 and 1996. In 1997, after some improvements to the treatment system of building 532, the Chimiotox Index dropped to 1821, meaning a 53% reduction. For 1998, the Chimiotox Index is based on metal reduction by the company. Installation in 1999 of an oil and grease treatment system, resulting in a 90% total reduction.

Table 1 ***Chimiotox Index (1995) - ICI Canada Inc.****

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
Total oil and grease	24.898	100	2490
Total lead	4.089	314	1284
Total copper	0.183	451	83
Nitrites-nitrates	8.571	5	43
Total iron	1.725	3.3	6
Total aluminum	0.073	11	1
Total cadmium	0.001**	909	1
Total zinc	0.129	9.4	1
Ammonia nitrogen	0.023	0.8	<1
Total phosphorus	0.003**	50	<1
Total manganese	0.006	10	<1
CHIMIOTOX INDEX			**3909**

* Assuming an effluent flowrate of 132 m^3/d (eleven substances selected in testing for more than 120).

** Load calculation based on analytical data which are near methodological detection limits.

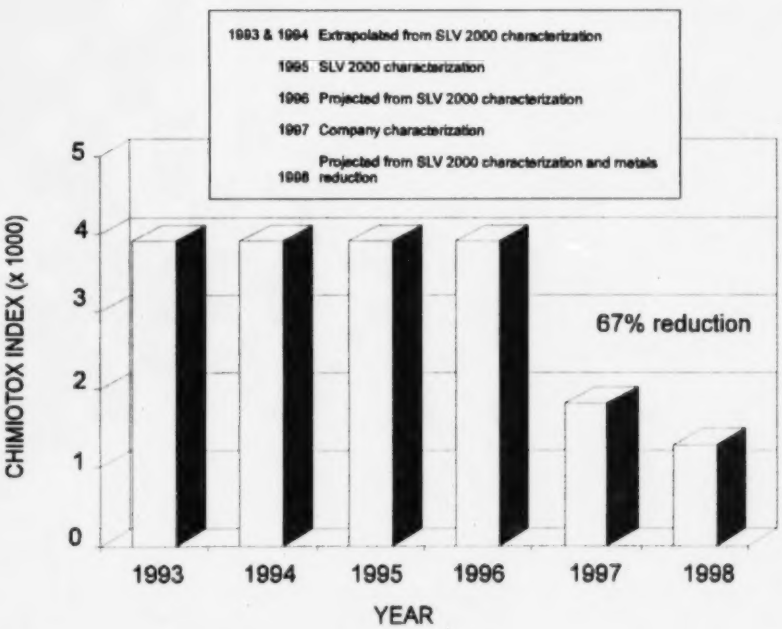

Figure 1 ***Chimiotox Index Trends (1993 to 1998) ICI Canada Inc.***

VIRTUAL ELIMINATION OF PERSISTENT TOXIC SUBSTANCES

One long-range objective of SLV 2000 is the virtual elimination of eleven persistent and bioaccumulative toxic substances from the effluent of 106 priority plants along the St. Lawrence and its tributaries. Thetargeted substances are those designated by the International Joint Commission in August 1993: PCBs, DDT, dieldrin, toxaphene, dioxins, furans, mirex, mercury, lead alkyls, benzo(*a*)py-rene and hexachlorobenzene. To reach this objective, Protection has fixed the environmental discharge objectives set for applicable substances as its target by the end of SLV 2000 in 1998, thereby ensuring that all uses of the receiving environment are protected.

None of these eleven persistent bioaccumulative toxic substances was detected in plant effluent during the 1995 SLV 2000 characterization.

PEEP TOXICITY REDUCTION

Low toxicity

The Potential Ecotoxic Effects Probe (PEEP) combines the results of six standardized bioassays measuring the toxic effects of effluent. Results are expressed on a logarithmic scale of increasing toxicity ranging from 1 to 10 and are used to monitor discharge trends over the years. In the case of the ICI CANADA INC. plant, a series of bioassays of effluent was conducted in 1995; yielding a PEEP index of 3.8, and showing low toxicity for the organisms tested.

REDUCTION IN SUBSTANCES MONITORED

Effluent flowrate and loads stable

According to the company data, in 1995 the plant discharged about 132 m^3/d of effluent, containing notably:

- 139 kg/d of chemical oxygen demand (COD)
- 11.7 kg/d of total oil and grease (O&G)
- 5.7 kg/d of suspended solids (SS)
- 12 kg/d of biochemical oxygen demand (BOD_5)

In 1997, oil and grease and suspended solids fell by 47% and 35% respectively due to improvements made to the wastewater treatment system.

KEY POINTS

- **Cleanup measures: facilities closed and raw materials replaced**
- **53% drop in Chimiotox Index resulting from improvements to the treatment system in 1997**
- **Other cleanup measures planned for 1998-1999: additional reduction in oil and grease and metal loads. An additional 14% decrease expected in 1998 and 67% total reduction in the Chimiotox Index**

Information revised January 1998

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Ministère de l'Environnement et de la Faune du Québec
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Saint-Laurent Vision 2000

INDUSTRIAL PLANTS

Highlights

FACT SHEET 55

ICI Explosives Inc.

801 Richelieu Blvd.
McMasterville, Quebec
J3G 1T9

A list of 106 industrial plants has been established under St. Lawrence Vision 2000 (SLV 2000), the second phase of the St. Lawrence Action Plan, launched in 1988. The overall objective is to reduce toxic effluent and virtually eliminate discharges of persistent toxic substances.

The 106 industrial plants designated under SLV 2000 are divided into four groups, each with a specific objective. The ICI EXPLOSIVES INC. plant in McMasterville is in Group 1, comprising plants that discharge inadequately treated effluent.

The objective for Group 1 is to reduce toxic effluent of targeted plants by 90%.

INDUSTRIAL PLANT

Explosives

The ICI EXPLOSIVES INC. plant produces pentaerythritol tetranitrate (PETN), sodium azide, ammonium nitrate, nitric acid and explosive emulsions. The PETN is obtained through a batch reaction between pentaerythritol and nitric acid, then recrystallized in acetone. In the sodium azide manufacturing process, ammonia reacts with molten sodium and is converted into sodium azide in a reaction with nitrous oxide and then purified. The ammonium nitrate in solution is obtained through a reaction between ammonia and nitric acid. In the production of nitric acid, the ammonia reacts with air at a high temperature. Explosive emulsions are the result of a mixture of oil, nitrate solution and various other solids and liquids. Annual production capacity of the plant is 350 t of PETN, 1000 t of sodium azide and 7800 t of ammonium nitrate. The plant operated at 70% capacity for PETN, 60% for sodium azide and 100% for ammonium nitrate. In 1997, the plant employed a work force of 200.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Nitric acid
- Ammonia
- Nitrous oxide
- Pentaerythritol
- Sodium
- Oil (emulsion)

FINISHED PRODUCTS

- Pentaerythritol tetranitrate (PETN)
- Explosive emulsions
- Ammonium nitrate
- Sodium azide

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

Nitrates and sulphates

Based on company data for 1993, the plant discharged an average of 26 784 m^3/d of effluents, containing notably:

- 690 kg/d of nitrates
- 410 kg/d of sulphates
- 250 kg/d of acetone
- 3 kg/d of TNT*

* The plant was producing trinitrotoluene (TNT) at the time

RESOURCES AND USES TO PRESERVE

Vacation area

Effluent from the ICI EXPLOSIVES INC. plant in McMasterville flows from the left bank of the Richelieu River. The Richelieu Valley is a major residential area, while the river is used for pleasure boating. Marinas and wharves, along with a campground, are located near McMasterville, downstream from the plant. The river is bordered by vacation areas and rest areas. Fishing enthusiasts make use of a number of locations in the area. The water intake for the Richelieu Valley intermunicipal water board (RIEVR) is located at Otterburn Park, upstream from the plant. The water supply system serves seven municipalities, including McMasterville. This water intake cannot be influenced by effluent from the plant, since it is on the opposite shore and upstream. The first water intake downstream from the plant is at Saint-Denis, about 28 km away; this structure belongs to the Lower Richelieu intermunicipal water supply committee (CAIBR), which serves eight municipalities.

ENVIRONMENTAL DISCHARGE OBJECTIVES

Environmental protection

Environmental discharge objectives are established to preserve local resources and uses. These guidelines, expressed as maximum permissible loads and concentrations for effluent released into the environment, are used in choosing treatment methods which best promote environmental protection. Environmental discharge objectives for ICI EXPLOSIVES INC. have been calculated and are avaible on request.

EFFLUENT TREATMENT

Treatment suited to processes

PETN wash water is neutralized with limestone, then discharged into the river; the acid used in the reaction is also recycled in the process, and acetone is recovered from the acetone-water mixture before discharge into the river. In the sodium azide and nitric acid processes, cooling water is the only material discharged into the environment. Wash water from the production of explosive emulsions is burned. The acidity of some discharge is reduced by treatment with sodium hydroxide. Domestic sewage is discharged into a septic field.

PREVENTION AND CLEANUP MEASURES IMPLEMENTED

Reduction in pollutant discharge

A cleanup agreement was signed in 1989. Since the research and contaminant reduction program began, work has been undertaken to reduce concentrations of TNT (1989 to 1991), acetone (since 1993) and ammonium nitrate in the effluent. All TNT production ceased in December 1995.

REGULATORY COMPLIANCE - WATER COMPONENT

Compliance with cleanup agreement standards

The ICI EXPLOSIVES INC. McMasterville plant is not subject to any special regulations on industrial wastewater. The company complies with the 1989 cleanup agreement standards.

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

Mainly total oil and grease

The Chimiotox index gauges the load of all toxic substances in industrial effluent using the toxicity factors assigned to each contaminant. It is used, among other things, to monitor discharge trends over the years (Figure 1) and determine the toxic contribution of each pollutant (Table 1).

Table 1 gives data from the characterization carried out in September 1995 under SLV 2000 along with Chimiotox values estimated from them, assuming an effluent flowrate of 34 116 m^3/d. Seven substances were selected in testing for more than 120. According to these data, total oil and grease represents 56% of the Chimiotox index, followed by nitrites-nitrates with 23%.

Figure 1 is plotted from 1995 SLV 2000 characterization data. The Chimiotox index estimated from the 1995 data was applied for the entire period between 1993 and 1998. Without appropriate information, it was impossible to determine the influence of cleanup measures and the closure of one production unit on the Chimiotox index.

Table 1 ***Chimiotox Index (1995) - ICI Explosives Inc.****

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
Total oil and grease	19.343	100	1934
Nitrites-nitrates	159.505	5	798
Total sulphides	0.958	500	479
Ammonia nitrogen	159.661	0.8	128
Total phosphorus	1.905	50	95
Total aluminum	0.042	11	<1
Total manganese	0.031	10	<1
CHIMIOTOX INDEX			**3435**

* Assuming an effluent flowrate of 34 116 m^3/d (7 substances selected in testing for more than 120).

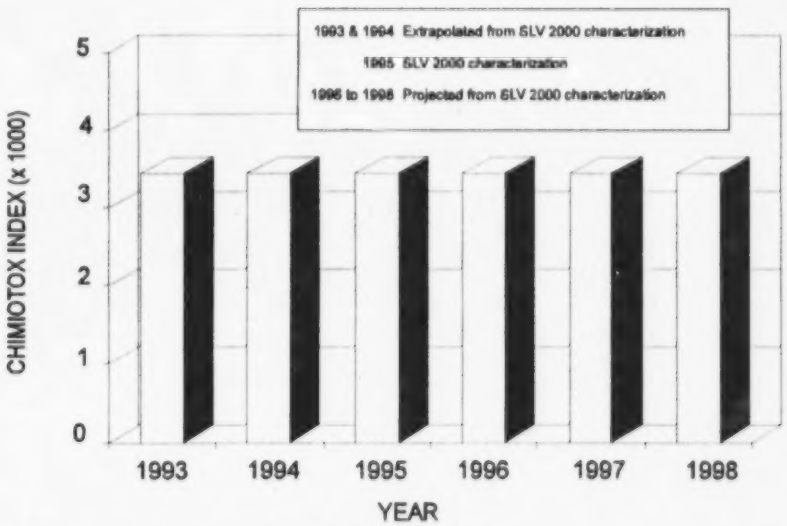

Figure 1 ***Chimiotox Index Trends (1993 to 1998) ICI Explosives Inc.***

VIRTUAL ELIMINATION OF PERSISTENT TOXIC SUBSTANCES

One long-range objective of SLV 2000 is the virtual elimination of eleven persistent and bioaccumulative toxic substances from the effluent of 106 priority plants along the St. Lawrence and its tributaries. The targeted substances are those designated by the International Joint Commission in August 1993: PCBs, DDT, dieldrin, toxaphene, dioxins, furans, mirex, mercury, lead alkyls, benzo(*a*)pyrene and hexachlorobenzene. To reach this objective, Protection has fixed the environmental discharge objectives set for applicable substances as its target by the end of SLV 2000 in 1998, thereby ensuring that all uses of the receiving environment are protected.

According to SLV 2000 characterization data for September 1995, none of the eleven persistent and bioaccumulative toxic substances were detected in the company's effluents.

PEEP TOXICITY REDUCTION

Low toxicity

The Potential Ecotoxic Effects Probe, or PEEP, combines the results of six standardized bioassays measuring the toxic effects of effluent. The results are expressed on a logarithmic scale of increasing toxicity ranging from 1 to 10 and are used to monitor discharge trends over the years. In the case of ICI EXPLOSIVES INC., a series of bioassays was carried out in 1995, yielding a PEEP of 3, and showing a low toxicity for the organisms tested.

REDUCTION IN SUBSTANCES MONITORED

Reduced loads

Based on company data for the first two quarters of 1997, the plant discharged an average of 20 155 m^3/d of effluents, containing notably:

- 265 kg/d of nitrates
- 54 kg/d of sulphates
- 10 kg/d of acetone

Between 1993 and 1997, nitrate and sulphate loads decreased by 62% and 87% respectively, while the acetone loads dropped by 96%. Before closure of the TNT unit, the TNT discharge was down 73%. The plant has discharged no further TNT since December 1995.

KEY POINTS

- **Cleanup measures ongoing since 1989 under a cleanup agreement**
- **Closure of TNT production unit in December 1995**

Information revised January 1998

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Saint-Laurent Vision 2000

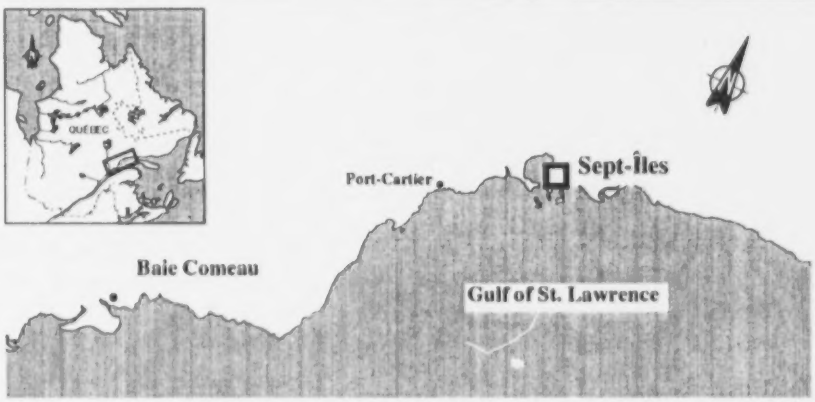
INDUSTRIAL PLANTS

Highlights

FACT SHEET 56

Wabush Mine

Pointe-Noire (P.O. Box 878)
Sept-Îles, Quebec
G4L 4L4



A list of 106 industrial plants has been established under St. Lawrence Vision 2000 (SLV 2000), the second phase of the St. Lawrence Action Plan, launched in 1988. The overall objective is to reduce toxic effluent and virtually eliminate discharges of persistent toxic substances.

The 106 industrial plants designated under SLV 2000 are divided into four groups, each with a specific objective. The WABUSH MINE works in Sept-Îles is in Group 1, comprising plants that discharge inadequately treated effluent.

The objective for Group 1 is to reduce toxic effluent discharges in targeted plants by 90%.

INDUSTRIAL PLANT

Iron ore concentrate processing

The WABUSH MINE works in Sept-Îles includes a pellet plant, port facilities, a yard, maintenance shops, maintenance facilities, a warehouse and an administrative building. Standard and self-melting pellets in two concentrations of manganese are produced from dry iron ore concentrate. Coke dust, bentonite and, since 1993, limestone are added to the concentrate before dry-grinding with steel balls. As the mixture leaves the ball mill, pulp from wash and cooling water thickeners is added. The pellets are formed in balling drums, then screened and passed through three hardening furnaces where they are heated in stages to 1302°C, following which they are cooled to 149°C and screened. The yard can hold 2 540 000 t of pellets and 355 600 t of iron ore concentrate. Annual production capacity of the plant is 6 096 300 t. In 1997, the plant operated at 88% design capacity and employed a work force of 320.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Iron ore concentrate
- Dolomite
- Coke dust
- Bentonite
- Steel pellets
- Limestone

FINISHED PRODUCTS

- Standard pellets
- Self-melting pellets
- Raw iron concentrate

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

Iron present

Based on 1991 company data, in 1993 the plant discharged 2060 m^3/d of effluent, containing notably:

- 6800 kg/d of suspended solids (SS)
- 5500 kg/d of iron

RESOURCES AND USES TO PRESERVE

Commercial fishing

Effluent from the WABUSH MINE works flows into the Gulf of St. Lawrence at the entrance to Sept Îles Bay. Sept-Îles is one of the busiest landing ports for North Shore commercial fishermen, who land snow crab, herring, shrimp, turbot, whelk, Stimpson's surf clam, scallops, and smaller quantities of lobster, cod, sole, lumpfish, capelin and smelt. The capelin and smelt cross the bay to get to their spawning grounds. The bay entrance contains marine mammals such as harbour porpoise, minke whale, finback whale, grey seal and harp seal, along with molluscs and crustaceans such as whelk, mussels, clams (softshell and razor), periwinkles, crab and lobster. Smelt are fished under the ice at the mouth of the Des Rapides river, which flows into the bay. The area contains several beaches, both public and private. In summer, the bay attracts water sports enthusiasts (windsurfing, kayaking and sailing). The bay also contains a marina and several wharves. There is a small cruise industry. The shores of the bay contain parks with walking areas and lookouts. The Sept Îles archipelago is a regional park. Hiking trails, campsites and picnic areas have been laid out on La Grande Basque Island, and the islands are used by divers.

ENVIRONMENTAL DISCHARGE OBJECTIVES

Environmental protection

Environmental discharge objectives are established to preserve local resources and uses. These guidelines, expressed as maximum permissible loads and concentrations for effluent released into the environment, are used in choosing treatment methods which best promote environmental protection. Environmental discharge objectives for WABUSH MINE have been calculated and are available on request.

EFFLUENT TREATMENT

Recirculation of raw materials

The process produces no effluent; however, washing of conveyors, platforms and floors produces large quantities of wastewater containing raw materials. Some of the wastewater is piped to thickeners. These devices recover part of the raw materials, which are then re-introduced into the process. The supernatant liquid is discharged into Sept Îles Bay. Domestic sewage from the facilities and the port septic field are treated in septic tanks and then discharged into the bay. The mechanical maintenance shops and the administrative buildings are linked to a septic tank with a tile field.

PREVENTION AND CLEANUP MEASURES IMPLEMENTED

Wash water recovery

Since 1990, the company has carried out work to recover wash water and channel it to thickeners. This work was aimed at reducing dischargse into the environment by recycling a greater share of raw materials. The last stage of the wash water recovery project was completed in the spring of 1997. As well, a wash water recirculation program was implemented in the fall of 1996 to reduce consumption of fresh water drawn from Lake Hall to eliminate surplus water in the thickeners. The total cost of the work is over $1.5 million.

REGULATORY COMPLIANCE - WATER COMPONENT

No specific regulations

The WABUSH MINE works in Sept-Îles is not subject to any specific regulations on effluent.

POLLUTION ABATEMENT

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

Mainly total arsenic

The Chimiotox index gauges the load of all toxic substances in industrial effluent using toxicity factors assigned to each contaminant. It is used, among other things, to monitor discharge trends over the years (Figure 1) and determine the toxic contribution of each pollutant (Table 1).

Table 1 gives data from the October 1995 SLV 2000 characterization along with the Chimiotox values calculated from them, assuming an effluent flowrate of 4305 m^3/d. Nineteen substances were selected in testing for more than 120. Based on these data, total arsenic accounts for 61% of the Chimotox index, followed by total iron with 28%.

Figure 1 is plotted from 1995 SLV 2000 characterization data. The Chimiotox index calculated from the 1995 data was reported unchanged for 1993 to 1998. The influence of improvements made between 1993 and 1997 was impossible to quantify and is not reflected in the figure.

Table 1 ***Chimiotox Index (1995) - Wabush Mine****

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
Total arsenic	0.694	57 143	39 673
Total iron	5548	3.3	18 309
Total manganese	301.299	10	3 013
Total oil and grease	16.423	100	1 642
Total sulphides	1.536	500	768
Total aluminum	55.754	11	613
Total mercury	0.002 **	166 667	261
Total chromium	0.377	500	189
Total copper	0.403	451	182
Total thallium	0.917	125	115
Total silver	0.002 **	10 000	18
Total phosphorus	0.193	50	10
Total zinc	0.694	9.4	7
Nitrites-nitrates	1.272	5	6
Ammonia nitrogen	5.012	0.8	4
Total nickel	0.346	10	3
Total cyanides	0.011	200	2
Acenaphthene	0.003	333	1
Naphthalene	0.017	34	1
CHIMIOTOX INDEX			**64 817**

* Assuming an effluent flowrate of 4305 m^3/d (19 substances selected in testing for more than 120).

** Load calculation based on analytical data which are near methodological detection limits.

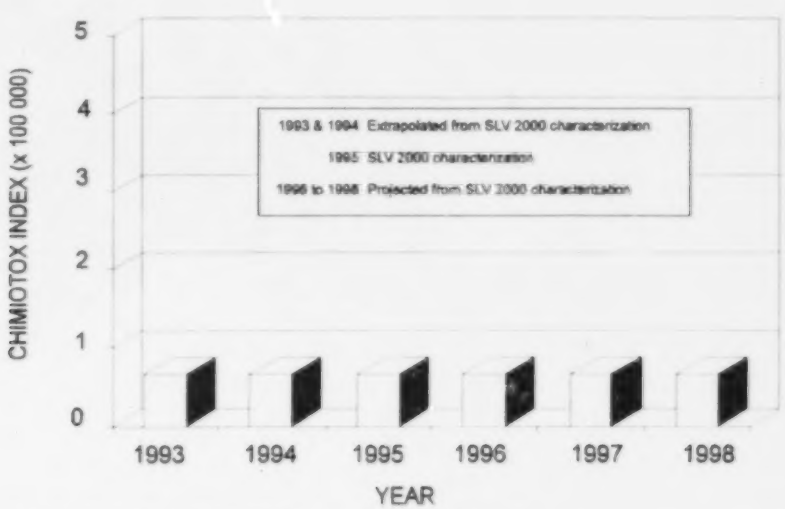


Figure 1 ***Chimiotox Index Trends (1993 to 1998) Wabush Mine***

VIRTUAL ELIMINATION OF PERSISTENT TOXIC SUBSTANCES

One long-range objective of SLV 2000 is the virtual elimination of eleven persistent and bioaccumulative toxic substances from the effluent of 106 priority plants along the St. Lawrence and its tributaries. The targeted substances are those designated by the International Joint Commission in August 1993: PCBs, DDT, dieldrin, toxaphene, dioxins, furans, mirex, mercury, lead alkyls, benzo(*a*)pyrene and hexachlorobenzene. To reach this objective, Protection has fixed the environmental discharge objectives set for applicable substances as its target by the end of SLV 2000 in 1998, thereby ensuring that all uses of the receiving environment are protected.

The 1995 SLV 2000 characterization showed the presence of one of the eleven persistent toxic substances, mercury. No environmental discharge objective has been calculated for this substance.

PEEP TOXICITY REDUCTION

Low toxicity

The Potential Ecotoxic Effects Probe (PEEP) combines the results of six standardized bioassays measuring the toxic effects of effluent. Results are expressed on a logarithmic scale of increasing toxicity ranging from 1 to 10 and are used to monitor discharge trends over the years. In the case of the WABUSH MINE facilities, a series of bioassays was carried out in 1995; yielding a PEEP of 1.3, and showing only low toxicity for the organisms tested.

REDUCTION IN SUBSTANCES MONITORED

Flowrate and charges generally stable

According to SLV 2000 characterization, in 1995 WABUSH MINE discharged 4305 m^3/d of effluent containing notably:

- 47 032 kg/d of suspended solids (ss)
- 5548 kg/d of iron

From 1993 to 1997, the effluent flowrate and the charges remained stable except in exceptional circumstances when thickeners overflowed. This situation occurred during the SLV 2000 characterization and lead to a significant increase in suspended solids.

KEY POINTS

- **From 1990 to 1997, implementation of a wash water recovery and recirculation system for an investment of over $1.5 million**

Information revised January 1998

ADDITIONAL INFORMATION

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Saint-Laurent Vision 2000

INDUSTRIAL PLANTS

Highlights

FACT SHEET 57

Norton Céramiques avancées du Canada inc.

D. R. Wilson Street
Shawinigan, Quebec
G9N 6W2

A list of 106 industrial plants has been established under St. Lawrence Vision 2000 (SLV 2000), the second phase of the St. Lawrence Action Plan, launched in 1988. The overall objective is to reduce toxic effluent and virtually eliminate discharges of persistent toxic substances.

The 106 industrial plants designated under SLV 2000 are divided into four groups, each with a specific objective. The NORTON CÉRAMIQUES AVANCÉES DU CANADA INC. plant in Shawinigan is in Group 1.

The objective for Group 1 is to reduce toxic effluent discharges in targeted plants by 90%.

INDUSTRIAL PLANT

Silicon carbide manufacturing

The NORTON CÉRAMIQUES AVANCÉES DU CANADA INC. plant in Shawinigan manufactures silicon carbide (SiC) from petroleum coke and silica sand in Acheson-type furnaces. The process water is drawn directly from the river and used only for cooling. Annual production capacity of the plant is 39 600 t. In 1997, the plant operated at 100% capacity and employed a work force of 120.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Silica sand
- Petroleum coke

FINISHED PRODUCT

- Silicon carbide

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

Mainly total solids

Based on the 1995 SLV 2000 characterization, in 1993 the plant discharged 6472 m^3/d of effluent, containing notably:

- 196 kg/d of total solids
- 19 kg/d of chemical oxygen demand (COD)
- 20 kg/d of sulphates
- 0.62 kg/d of copper

RESOURCES AND USES TO PRESERVE

Vacation area

The NORTON CÉRAMIQUES AVANCÉES DU CANADA INC. plant discharges effluent into the Saint-Maurice River, not far from a marina, a federal wharf and a vacation area. This stretch of the Saint-Maurice River attracts sport fishermen and pleasure boaters. Parc des Chutes offers a panoramic view of the Shawinigan Falls and the Saint-Maurice River. In the city of Shawinigan, a park and a walkway run along the banks of the river just over a kilometre from the plant's effluent discharge point. Some 20 fish species inhabit this part of the river, including yellow walleye, northern pike and smallmouth bass. This stretch of the river also offers sites favourable for spawning and even a spot used for swimming. Trois-Rivières draws its drinking water from the Saint-Maurice River, about 7 km from its mouth.

ENVIRONMENTAL DISCHARGE OBJECTIVES

Environmental protection

Environmental discharge objectives are established to preserve local resources and uses. These guidelines, expressed as maximum permissible loads and concentrations for effluent released into the environment, are used in choosing treatment methods which best promote environmental protection. Environmental discharge objectives for NORTON CÉRAMIQUES AVANCÉES DU CANADA INC. are available on request.

EFFLUENT TREATMENT

Cooling water and domestic sewage

Effluent consists of cooling water and domestic sewage. It is channelled to the public sewer system, which empties into the Saint-Maurice River.

PREVENTION AND CLEANUP MEASURES IMPLEMENTED

Septic tank to be installed

The company is planning to separate its shower water in the spring of 1998. Domestic sewage will go through independent treatment systems. This work will also be carried out in the spring of 1998.

REGULATORY COMPLIANCE - WATER COMPONENT

No regulations

Effluent from the NORTON CÉRAMIQUES AVANCÉES DU CANADA INC. plant is not subject to any specific regulations.

POLLUTION ABATEMENT

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

Mainly total copper

The Chimiotox index gauges the load of all toxic substances in industrial effluent using toxicity factors assigned to each contaminant. It is used, among other things, to monitor discharge trends over the years (Figure 1) and determine the toxic contribution of each pollutant (Table 1).

Table 1 gives SLV 2000 characterization data collected in 1995 along with the Chimiotox values estimated from them, assuming an effluent flowrate of 6472 m^3/d. Nine substances were selected in testing for more than 120. According to these data, total copper accounts for 31% of the Chimiotox index, total sulphides and total oil and grease each acounted for 26%.

Figure 1 was plotted from the SLV 2000 characterization data collected in 1995. The Chimiotox index estimated from the 1995 data was reported unchanged for 1993 to 1998. No major changes have been made to the process or the treatment system since 1993.

Table 1 ***Chimiotox Index (1995) - Norton Céramiques avancées du Canada inc.****

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
Total copper	0.625	451	282
Total sulphides	0.474	500	237
Total oil and grease	2.360	100	236
Total lead	0.292	314	92
Benzo(a)pyrene	0.0004**	100 000	40
Benzo(a)anthracene	0.001**	32 154	24
Nitrites-nitrates	0.335	5	2
Ammonia nitrogen	2.141	0.8	2
Total manganese	0.186	10	2
Total iron	0.187	3.3	1
CHIMIOTOX INDEX			**915**

* Assuming an effluent flowrate of 6472 m^3/d (9 substances selected in testing for more than 120).

** Load calculation based on analytical data which are near methodological detection limits.

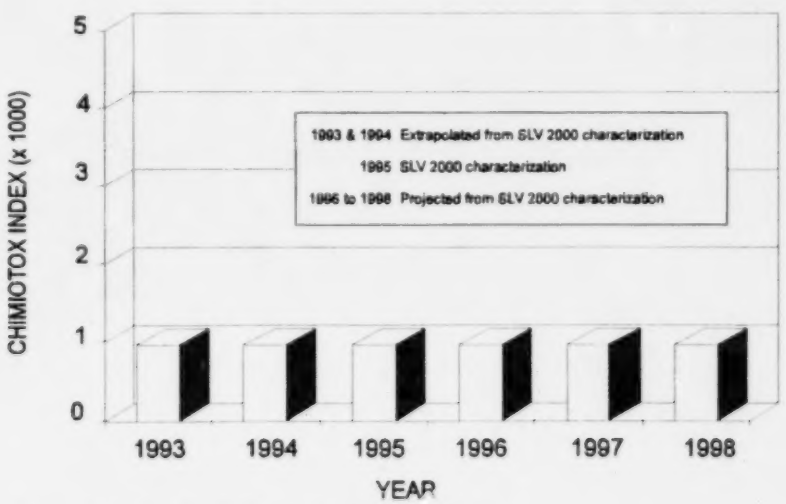

Figure 1 ***Chimiotox Index Trends (1993 to 1998) Norton Céramiques avancées du Canada inc.***

VIRTUAL ELIMINATION OF PERSISTENT TOXIC SUBSTANCES

One long-range objective of SLV 2000 is the virtual elimination of eleven persistent and bioaccumulative toxic substances from the effluent of 106 priority plants along the St. Lawrence and its tributaries. The targeted substances are those designated by the International Joint Commission in August 1993: PCBs, DDT, dieldrin, toxaphene, dioxins, furans, mirex, mercury, lead alkyls, benzo(*a*)pyrene and hexachlorobenzene. To reach this objective, Protection has fixed the environmental discharge objectives set for applicable substances as its target by the end of SLV 2000 in 1998, thereby ensuring that all uses of the receiving environment are protected.

Benzo(*a*)pyrene was detected during the 1995 SLV 2000 characterization; theconcentration was 0.08 µg/L. The company meets the environmental discharge objective for polycyclic aromatic hydrocarbons (including benzo(*a*)pyrene), which is 3.1 µg/L.

PEEP TOXICITY REDUCTION

Moderate toxicity

The Potential Ecotoxic Effects Probe, or PEEP, combines the results of six standardized bioassays measuring the toxic effects of effluent. The results are expressed on a logarithmic scale of increasing toxicity ranging from 1 to 10 and are used to monitor discharge trends over the years. In the case of the NORTON CÉRAMIQUES AVANCÉES DU CANADA INC. plant, a series of bioassays was conducted in 1995; yielding a PEEP of 3.6, and showing moderate toxicity for the organisms tested.

REDUCTION IN SUBSTANCES MONITORED

Stable loads

The 1995 SLV 2000 characterization data are the most recent available. No major changes have been made to the process or the treatment system since the beginning of the SLV 2000 program in 1993.

KEY POINTS

- **Effluent consists of cooling water and domestic sewage**
- **Domestic sewage will be treated beginning in spring 1998**

Information revised January 1998

ADDITIONAL INFORMATION

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Saint-Laurent Vision 2000

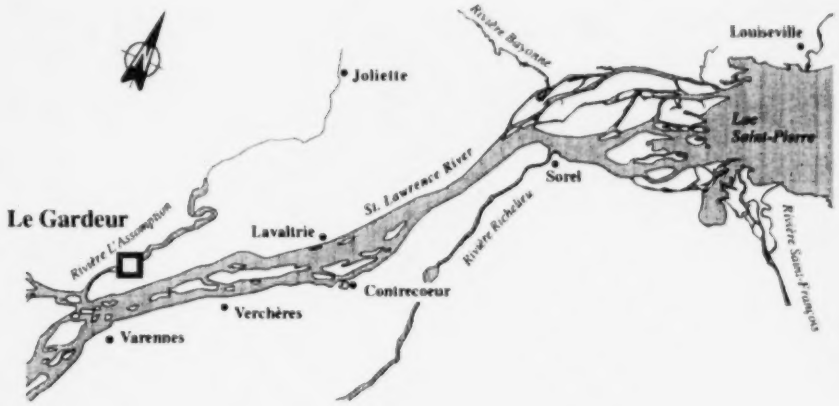
INDUSTRIAL PLANTS

Highlights

FACT SHEET 58

SNC Industrial Technologies Inc.

5 montée des Arsenaux
Le Gardeur, Quebec
J5Z 2P4



A list of 106 industrial plants has been established under St. Lawrence Vision 2000 (SLV 2000), the second phase of the St. Lawrence Action Plan, launched in 1988. The overall objective is to reduce toxic effluent and virtually eliminate discharges of persistent toxic substances.

The 106 industrial plants designated under SLV 2000 are divided into four groups, each with a specific objective. The SNC INDUSTRIAL TECHNOLOGIES INC. plant in Le Gardeur is part of Group 1, comprising plants that discharge inadequately treated effluent.

The objective for Group 1 is to reduce toxic effluent discharges in targeted plants by 90%.

INDUSTRIAL PLANT

Explosives plant

SNC INDUSTRIAL TECHNOLOGIES INC. in Le Gardeur inserts explosives into various types of munitions and explosive and pyrotechnic components. It also assembles small and medium-calibre military cartridges. Ninety-seven per cent of the explosives are purchased, while the rest are manufactured in the plant. The explosives handled are strictly controlled and, for security reasons, there are no floor drains. In 1997, the plant operated at 15% to 20% capacity and employed a work force of 600.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Explosives
- Chemicals (barium and potassium nitrates, antimony resins, titanium, sealers, glues, paint, inks and solvents)
- Inert solids (cartridge cases, projectiles, papers, machined metal, felt, and wooden, cardboard and plastic packaging)

FINISHED PRODUCTS

- Small and medium-calibre cartridges
- Military equipment (explosive components, gas masks, bullet-proof vests, etc.)

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

High recirculation rate

Most of the industrial wastewater is recirculated. Effluents are not analyzed.

RESOURCES AND USES TO PRESERVE

Many fish species

Effluent from the SNC INDUSTRIAL TECHNOLOGIES INC. plant is discharged into the L'Assomption river after preliminary treatment. The plant sewer has been connected to the municipal sewer system since the end of 1996. The Le Gardeur-Charlemagne sewage treatment plant (aerated lagoons) has been in operation since September 1996. Effluent from the sewage treatment plant is discharged into the L'Assomption river 2 km from its mouth. The stretch of river between the discharge point and the St. Lawrence is frequented by yellow sturgeon as they move to their spawning grounds. The area is also used by many other fish species, including pike, brown bullhead, sand pickerel, yellow walleye, lake perch and burbot. The shoreline is marked by residential properties, private wharves and boat ramps.

ENVIRONMENTAL DISCHARGE OBJECTIVES

Environmental protection

Environmental discharge objectives are established to preserve local resources and uses. These guidelines, expressed as maximum permissible loads and concentrations for effluent released into the environment, are used in choosing treatment methods which best promote environmental protection. In the case of SNC INDUSTRIAL TECHNOLOGIES INC., there are no environmental discharges objectives since, in general, there is no more industrial effluent, most of the processes being conducted in a closed-circuit system.

EFFLUENT TREATMENT

Recirculation of industrial wastewater

Industrial wastewater is mainly produced by equipment and shop cleaning. The wastewater is collected in settling ponds and sewage treatment tanks, from which the greater part is recirculated. Each building has its own treatment system, depending on the process used. Some wastewater is treated by filtration through bag and activated charcoal filters (portable and fixed units), and some by flocculation, precipitation, filtration and activated-charcoal adsorption. The treated water is reused or discharged from the plant into the sanitary or strorm sewer. There are four major types of effluent: uncontaminated water, which is discharged into storm sewer; domestic sewage, 75% of which is discharged into the municipal sewer system; wastewater that has been in contact with explosives, 95% of which is reused or sent to an authorized firm to be discharged (it may occasionally be discharged into the municipal sewer system); and finally wastewater that has been in contact with explosives, 90% of which is discharged into the municipal sewer system or reused.

PREVENTION AND CLEANUP MEASURES IMPLEMENTED

Connection to municipal system

Since August 1991, SNC INDUSTRIAL TECHNOLOGIES INC. has carried out a number of cleanup operations for various buildings. Installation of a separation sewer was begun in the summer of 1995. Partial connection of the separation sewer to the municipal sewerage system and the Le Gardeur-Charlemagne sewage treatment plant has been under way since fall 1996; the work should be completed for the summer of 2000. Since May 1996, the plant has been using an ultra-sound cleaning process to completely eliminate the use of trichloroethane. It also recovers mercury used in its laboratories.

REGULATORY COMPLIANCE - WATER COMPONENT

No specific regulations

The SNC INDUSTRIAL TECHNOLOGIES INC. plant in Le Gardeur is not governed by any particular regulation with respect to industrial wastewater. However, effluent discharged into the municipal sewer system has to comply with the applicable municipal bylaws.

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

No characterization

The Chimiotox index gauges the load of all toxic substances present in industrial effluent using the toxicity factors assigned to each contaminant. It is used, among other things, to monitor discharge trends over the years and determine the toxic contribution of each pollutant.

Since in general the plant no longer discharges industrial effluent contaminated by explosives or other non-conventional contaminants, no exhaustive effluent characterization has been carried out under SLV 2000 for the SNC INDUSTRIAL TECHNOLOGIES INC. plant in Le Gardeur. There is not enough data to calculate the Chimiotox index.

Table 1 ***Chimiotox Index - SNC Industrial Technologies Inc.***

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
Since no exhaustive characterization of effluents from the SNC INDUSTRIAL TECHNOLOGIES INC. plant has been made, there is not enough data to calculate the Chimiotox index.			
CHIMIOTOX INDEX			**N/A**

VIRTUAL ELIMINATION OF PERSISTENT TOXIC SUBSTANCES

One long-range objective of SLV 2000 is the virtual elimination of eleven persistent and bioaccumulative toxic substances from the effluent of 106 priority plants along the St. Lawrence and its tributaries.The targeted substances are those designated by the International Joint Commission in August 1993: PCBs, DDT, dieldrin, toxaphene, dioxins, furans, mirex, mercury, lead alkyls, benzo(*a*)pyrene and hexachlorobenzene. To reach this objective, Protection has fixed the environmental discharge objectives set for applicable substances as its target by the end of SLV 2000 in 1998, thereby ensuring that all uses of the receiving environment are protected.

In general, the plant no longer discharges industrial effluent contaminated by explosives or other non-conventional contaminants.

PEEP TOXICITY REDUCTION

No bioassays

The Potential Ecotoxic Effects Probe, or PEEP, combines the results of six standardized bioassays measuring the toxic effects of effluent. The results are expressed on a logarithmic scale of increasing toxicity ranging from 1 to 10 and are used to monitor discharge trends over the years. In the case of the SNC INDUSTRIAL TECHNOLOGIES INC. plant, there will be no SLV 2000 ecaracterization because, in general, the plant no longer discharges industrial wastewater.

REDUCTION IN SUBSTANCES MONITORED

Low flows

Based on company figures for 1997, the plant discharges 356 m^3/d of uncontaminated water into the river, approximately 10 m^3/d of water from the X-ray film development process, 19 m^3/d of domestic sewage and 553 m^3/d of infiltration and surface water.

KEY POINTS

- **Partial connection to the Le Gardeur-Charlemagne sewage treatment plant since fall 1996**

Information updated January 1998

ADDITIONAL INFORMATION

Chimiotox Index and PEEP:
Gilles Legault, Environment Canada
(514) 283-3452

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Ministère de l'Environnement et de la Faune du Québec
Francine Richard
François Rocheleau

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Saint-Laurent Vision 2000

INDUSTRIAL PLANTS

Highlights

FACT SHEET 59

Napierville Refineries Inc.

175 de l'Église Street
Napierville, Quebec
J0J 1L0

A list of 106 industrial plants has been established under St. Lawrence Vision 2000 (SLV 2000), the second phase of the St. Lawrence Action Plan, launched in 1988. The overall objective is to reduce toxic effluent and virtually eliminate discharges of persistent toxic substances.

The 106 industrial plants designated under SLV 2000 are divided into four groups, each with a specific objective. The NAPIERVILLE REFINERIES INC. plant in Napierville is in Group 1, comprising plants that discharge inadequately treated effluent.

The objective for Group 1 is to reduce toxic effluent discharges in targeted plants by 90%.

INDUSTRIAL PLANT

Naphthalene purification

The NAPIERVILLE REFINERIES INC. plant in Napierville purifies naphthalene and packages 1,4-dichlorobenzene and 1,2-dichlorobenzene as well as naphthalene. There are several steps in the purification process: crystallization, centrifugal solids separation, solids recovery, and distillation of the solvent used for crystallization. Certain process steps are sometimes repeated more than once depending on the desired degree of purity. A final distillation is performed to make the naphthalene whiter. The finished product (as well as 1,4-dichlorobenzene) is solidified and indirectly water cooled for packaging. 1,2-dichlorobenzene is received in liquid form by rail and placed in drums; it is not transformed in any way. Annual production capacity of the plant is 40 000 t (finished product). In 1997, the plant operated at 75% capacity and employed a work force of 39.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Raw naphthalene
- 1,4-dichlorobenzene
- 1,2-dichlorobenzene

FINISHED PRODUCTS

- Refined naphthalene
- 1,4-dichlorobenzene (packaged)
- 1,2-dichlorobenzene (packaged)

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

Dichlorobenzenes

According to biennial industrial wastewater analyses, in 1993 the plant discharged an average of 2117 m^3/d of effluent, containing notably:

- 0.74 kg/d of 1,4-dichlorobenzene
- 0.39 kg/d of 1,2-dichlorobenzene
- 0.14 kg/d of 1,3-dichlorobenzene

RESOURCES AND USES TO PRESERVE

Abundant and varied aquatic life

The NAPIERVILLE REFINERIES INC. plant empties its effluent into the L'Acadie River, a tributary of the Richelieu. Aquatic life is abundant and varied in the L'Acadie River, despite the mediocre quality of the water. The first drinking water intake downstream of the plant is on the Richelieu, opposite Otterburn Park; this intake belongs to the ***Régie intermunicipale de l'eau de la vallée de la Richelieu*** (the Richelieu valley intermunicipal water commission). According to surveys conducted by the Ministère de l'Environnement et de la Faune du Québec (MEF), 35 species of fish inhabit the L'Acadie River, and there are spawning grounds and rearing areas. Two spawning grounds were discovered close to the plant. The quick-water spawning grounds are also feeding areas. The L'Acadie River is suitable for commercial live-bait fishing and sport fishing (yellow walleye and northern pike), especially at the confluence with the Richelieu. There is also a campground and a cottaging area along the banks of the L'Acadie River downstream of the Brunelle bridge.

ENVIRONMENTAL DISCHARGE OBJECTIVES

Environmental protection

Environmental discharge objectives are established to preserve local resources and uses. These guidelines, expressed as maximum permissible loads and concentrations for effluent released into the environment, are used in choosing treatment methods which best promote environmental protection. Environmental discharge objectives for the NAPIERVILLE REFINERIES INC. have been calculated and are available on request.

EFFLUENT TREATMENT

Treatment of chlorobenzenes, recovery of oil and settleable matter

Process water is sent to a stripper to treat the chlorobenzenes. Gases from the stripper are channelled to two biological filters. The NAPIERVILLE REFINERIES INC. plant empties its wastewater (cooling water and runoff) into a retention basin where entrained oils and settleable solids are recovered. The treated effluent is then discharged in the L'Acadie River. The plant's water supply comes from groundwater and rainwater. Domestic sewage is channelled to the Napierville wastewater treatment plant.

PREVENTION AND CLEANUP MEASURES IMPLEMENTED

Introduction of chlorobenzene treatment and confinement of new areas

A stripper was installed to treat chlorobenzenes and two biological filters were put in place to treat gases. A retention basin was built around discontinuous distillation reservoirs. An asphalt cover confines the new area to reduce the infiltration of rainwater in the area of contaminated soil.

REGULATORY COMPLIANCE - WATER COMPONENT

A soil cleanup agreement

In 1992, NAPIERVILLE REFINERIES INC. signed an agreement to clean up contaminated soil which could affect the groundwater supplying indirect cooling water used in the plant process. The next set of effluent standards will stem from this agreement, valid until the year 2000.

In 1998, the company will continue to monitor its effluent to determine the effectiveness of its treatment process and make any changes required.

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

Chlorobenzenes

The Chimiotox index gauges the load of all toxic substances in industrial effluent using toxicity factors assigned to each contaminant. It is used, among other things, to monitor discharge trends over the years (Figure 1) and determine the toxic contribution of each pollutant (Table 1).

Table 1 shows SLV 2000 characterization data collected in April 1995 and the Chimiotox values estimated from them, assuming an effluent flowrate of 2117 m^3/d. Six substances were selected in testing for more than 120. Based on these data, 1,4-dichlorobenzene accounts for 52% of the Chimiotox index, 1,3-dichlorobenzene for 28%, and 1,2,4-trichlorobenzene for 11%.

Figure 1 is plotted from SLV 2000 characterization data and data collected in 1997. The Chimiotox index calculated from these data was reported unchanged for 1993 to 1998. The reductions reported in 1997 and 1998 are related to cleanup measures introduced by the company.

Table 1 ***Chimiotox Index (1995) - Napierville Refineries Inc.****

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
1,4-dichlorobenzene	0.212	250	53
1,3-dichlorobenzene	0.072	400	29
1,2,4-trichlorobenzene	0.006	2 000	11
1,2-dichlorobenzene	0.034	143	5
1,2,3,5-tetrachlorobenzene	3×10^{-4}**	10 000	3
1,2,3-trichlorobenzene	2.57×10^{-4}**	2 000	1
CHIMIOTOX INDEX			**102**

* Assuming an effluent flowrate of 2117 m^3/d (6 substances selected in testing for more than 120).

**Load calculation based on analytical data which are near methodological detection limits.

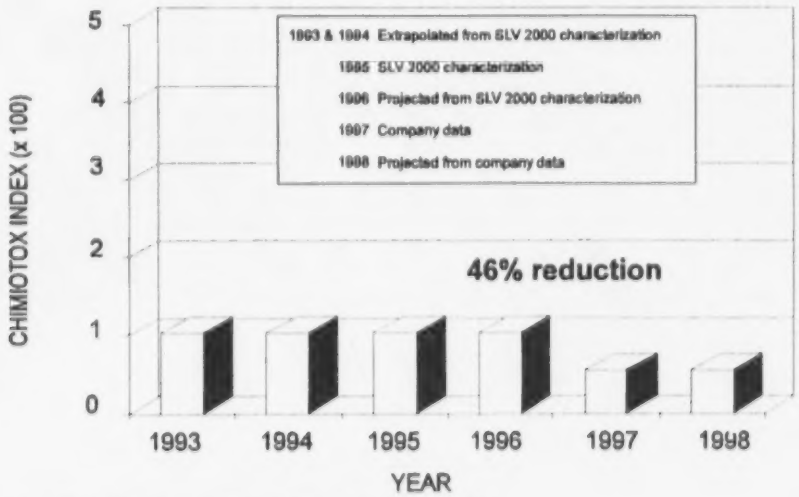

Figure 1 ***Chimiotox Index Trends (1993 to 1998) Napierville Refineries Inc.***

VIRTUAL ELIMINATION OF PERSISTENT TOXIC SUBSTANCES

One long-range objective of SLV 2000 is the virtual elimination of eleven persistent and bioaccumulative toxic substances from the effluent of the 106 priority plants along the St. Lawrence and its tributaries. The targeted substances are those designated by the International Joint Commission in August 1993: PCBs, DDT, dieldrin, toxaphene, dioxins, furans, mirex, mercury, lead alkyls, benzo(*a*)pyrene and hexachlorobenzene. To reach this objective, Protection has fixed the environmental discharge objectives set for applicable substances as its target by the end of SLV 2000 in 1998, thereby ensuring that all uses of the receiving environment are protected.

None of the eleven targeted persistent and bioaccumulative toxic substances were detected in effluent from the NAPIERVILLE REFINERIES INC. plant during the 1995 SLV 2000 characterization.

PEEP TOXICITY REDUCTION

Low toxicity

The Potential Ecotoxic Effects Probe (PEEP) combines the results of six standardized bioassays measuring the toxic effects of effluent. The results are expressed on a logarithmic scaleof increasing toxicity ranging from 1 to 10 and are used to monitor discharge trends over the years. In the case of the NAPIERVILLE REFINERIES INC. plant, a series of bioassays was carried out during the 1995 SLV 2000 characterization, yielding a PEEP of 2.9, and showing low toxicity for the organisms tested.

REDUCTION IN SUBSTANCES MONITORED

Reduction in dichlorobenzenes

According to the biennial industrial wastewater analyses, in 1997 the plant discharged an average of 2117 m^3/d of effluent, containing notably:

- 0.148 kg/d of 1,4-dichlorobenzene
- 0.008 kg/d of 1,2-dichlorobenzene
- 0.043 kg/d of 1,3-dichlorobenzene

Between 1993 and 1997, the 1,2-dichlorobenzene loads dropped 98%, and the 1,4-dichlorobenzene and 1,3-dichlorobenzene loads dropped 80% and 70% respectively. These reductions are the result of cleanup measures introduced by the company.

KEY POINTS

- **46% reduction in Chimiotox index due to cleanup measures introduced**

Information revised January 1998

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Saint-Laurent Vision 2000

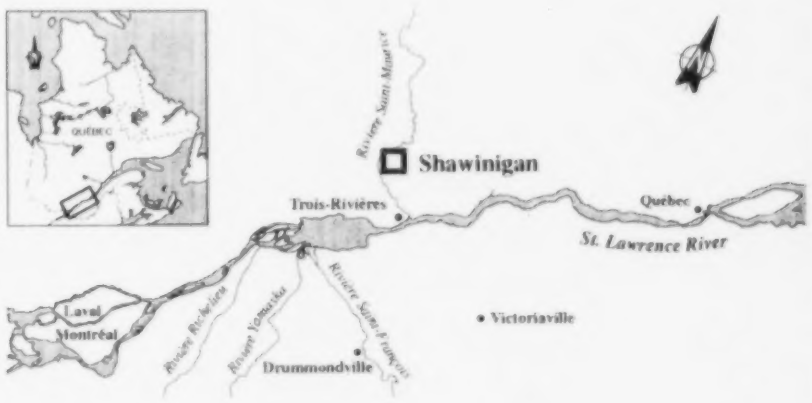
INDUSTRIAL PLANTS

Highlights

FACT SHEET 60

Alcan Smelters and Chemicals Ltd, Shawinigan Works

1100 Saint-Sacrement Blvd.
Shawinigan, Quebec
G9N 6W4



A list of 106 industrial plants has been established under St. Lawrence Vision 2000 (SLV 2000), the second phase of the St. Lawrence Action Plan, launched in 1988. The overall objective is to reduce toxic effluent and virtually eliminate discharges of persistent toxic substances.

The 106 industrial plants designated under SLV 2000 are divided into four groups, each with a specific objective. The ALCAN SMELTERS AND CHEMICALS LTD, SHAWINIGAN WORKS, in Shawinigan is in Group 1.

The objective for Group 1 is to reduce toxic effluent discharges in targeted plants by 90%.

INDUSTRIAL PLANT

Aluminum smelter

The ALCAN SMELTERS AND CHEMICALS LTD, SHAWINIGAN WORKS plant uses an electrolysis process that reduces alumina to aluminum using Söderberg-type anodes with horizontal studs; the annual production capacity of the process is 84 000 t. Gases emitted are recovered using wet scrubbers. The four-stage aluminum casting line includes a retention furnace, alloy furnace, and facilities for oxidation of impurities and ingot casting. The plant also has an annual production capacity of 42 800 t of liquid alum. The alum process used is a chemical reaction of aluminum hydrate with water and sulphuric acid. The plant produces anode paste briquettes, which contain a mixture of pitch and coke. The annual briquette production capacity is 120 000 t. In 1997, the plant operated at 100% capacity and employed a work force of 571.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Alumina
- Coke
- Pitch
- Sulphuric acid
- Hydrates
- Metals for alloys (chromium, copper, iron, magnesium, manganese)

FINISHED PRODUCTS

- Söderberg paste briquettes
- Aluminum ingots
- Liquid alum

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

Fluorides and aluminum

Based on company data, in 1993 the plant discharged an average of 6694 m^3/d of effluent, containing notably:

- 125.5 kg/d of suspended solids (SS)
- 10 kg/d of oil and grease (O&G)
- 5.5 kg/d of fluorides
- 3 kg/d of aluminum

RESOURCES AND USES TO PRESERVE

Resort areas

Effluents from the ALCAN SMELTERS AND CHEMICALS LTD, SHAWINIGAN WORKS plant is discharged into the Saint-Maurice River. A marina, a federal government wharf and resort and recreation areas are located not far from the discharge point. The area is used for sport fishing and pleasure boating. The region includes the Parc des Chutes, providing a panoramic view of the Shawinigan Falls and the Saint-Maurice River. The city of Shawinigan has built an urban park and walkway along the river, a little over a kilometre from the effluent discharge point. Some twenty species of fish live in the Saint-Maurice River, including yellow walleye, northern pike and small-mouth bass. The river is also used by waterfowl and swimmers, and contains many spawning areas. Trois-Rivières draws its drinking water from the Saint-Maurice River, about 7 km from where it meets the St. Lawrence River.

ENVIRONMENTAL DISCHARGE OBJECTIVES

Environmental protection

Environmental discharge objectives are established to preserve local resources and uses. These guidelines, expressed as maximum permissible loads and concentrations for effluent released into the environment, are used in choosing treatment methods which best promote environmental protection. Environmental discharge objectives for ALCAN SMELTERS AND CHEMICALS LTD, SHAWINIGAN WORKS have been calculated and are available on request.

EFFLUENT TREATMENT

Water recirculation

Wastewater from the wet scrubbers is treated by the addition of lime, allowed to settle and then recycled, while the sludge is dried. Direct cooling water from the casting process is discharged untreated into the municipal sewer system. Indirect cooling water from electrical rectifiers is air-cooled in a pond and then recycled. Rainwater is separated and discharged into the Saint-Maurice River. Domestic sewage is separated then discharged into the municipal sewer system.

PREVENTION AND CLEANUP MEASURES IMPLEMENTED

Restoration of sedimentation basin site

Wastewater from the alum and anode paste plants has been recirculated in a closed circuit since September 1992. In the fall of 1995, the plant completed a comprehensive site restoration program. The project involved covering the old wet scrubber settling pond with an impermeable membrane and plant cover, and installing a soil-bentonite barrier to prevent groundwater intake.

Since January 1998, the company has been using synthetic vegetable oil on its casting line. This has decreased the consumption of oil by half, thereby reducing the effluent load.

The city of Shawinigan's wastewater treatment plant is scheduled to open in 1999. Domestic sewage and industrial wastewater will be separated and the domestic sewage will be treated at the Shawinigan wastewater treatment plant (aerated ponds).

REGULATORY COMPLIANCE - WATER COMPONENT

No specific regulations

The ALCAN SMELTERS AND CHEMICALS LTD, SHAWINIGAN WORKS plant is not subject to any specific wastewater regulations.

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

Mainly total oil and grease

The Chimiotox index gauges the load of all toxic substances present in industrial effluent using the toxicity factors assigned to each contaminant. It is used, among other things, to monitor discharge trends over the years (Figure 1) and determine the toxic contribution of each pollutant (Table 1).

Table 1 gives SLV 2000 characterization-data collected in March 1995 along with the Chimiotox values estimated from them, assuming an effluent flowrate of 5610 m^3/d. Eight substances were selected in testing for more than 120. Based on these data, total oil and grease account for 54% of the Chimiotox index.

Figure 1 is plotted from the SLV 2000 characterization data collected in 1995. The Chimiotox index calculated from these data was reported unchanged for 1993 to 1997. The reduction in 1998 is due to the use of synthetic vegetable oil on the casting line, which reduces the effluent load.

Table 1 ***Chimiotox Index (1995) - Alcan Smelters and Chemicals Ltd, Shawinigan Works****

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
Total oil and grease	16.143	100	1 614
Benzo(*b+k*)fluoranthene	0.014	32 154	434
Dibenzo(*a,h*)anthracene	0.004	100 000	377
Benzo(a)pyrene	0.003	100 000	297
1,2,3-Indeno(*cd*)pyrene	0.003	32 154	103
Benzo(*a*)anthracene	0.003	32 154	91
Total aluminum	6.963	11	77
Anthracene	0.0005	32 154	15
CHIMIOTOX INDEX			**3 008**

* For an effluent flowrate of 5610 m^3/d (8 substances selected in testing for more than 120).

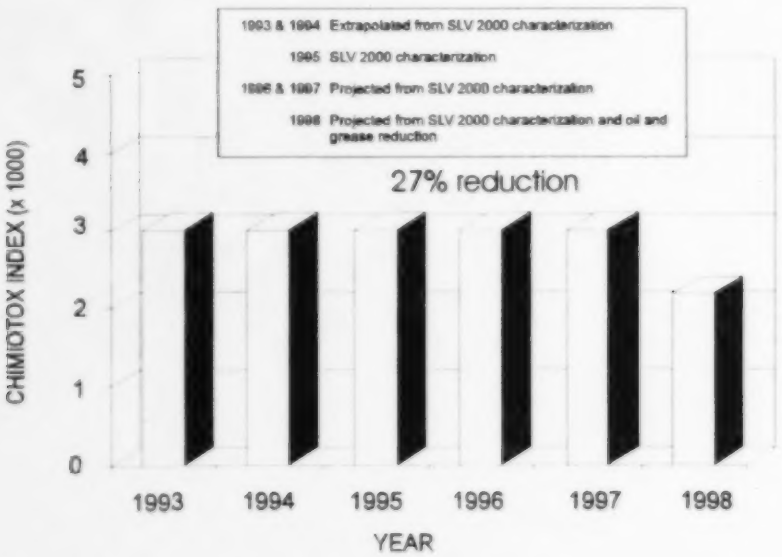


Figure 1 ***Chimiotox Index Trends (1993-1998) Alcan Smelters and Chemicals Ltd, Shawinigan Works***

VIRTUAL ELIMINATION OF PERSISTENT TOXIC SUBSTANCES

One long-range objective of SLV 2000 is the virtual elimination of eleven persistent and bioaccumulative toxic substances from the effluent of the 106 priority plants along the St. Lawrence and its tributaries. The targeted substances are those designated by the International Joint Commission in August 1993: PCBs, DDT, dieldrin, toxaphene, dioxins, furans, mirex, mercury, lead alkyls, benzo(*a*)pyrene and hexachlorobenzene. To reach this objective, Protection has fixed the environmental discharge objectives set for applicable substances as its target by the end of SLV 2000 in 1998, thereby ensuring that all uses of the receiving environment are protected.

During the 1995 SLV 2000 characterization, one persistent toxic substance was found in effluent from the ALCAN SMELTERS AND CHEMICALS LTD, SHAWINIGAN WORKS plant: the benzo(*a*)pyrene concentration was 2.81 µg/L. This value meets the environmental discharge objective for polycyclic aromatic hydrocarbons (including benzo(*a*)pyrene), which is 3.1 µg/L.

PEEP TOXICITY REDUCTION

Low toxicity

The Potential Ecotoxic Effects Probe (PEEP) combines the results of six standardized bioassays measuring the toxic effects of effluent. The results are expressed on a logarithmic scale of increasing toxicity ranging from 1 to 10 and are used to monitor discharge trends over the years. In the case of the ALCAN SMELTERS AND CHEMICALS LTD, SHAWINIGAN WORKS, a series of bioassays was conducted in 1995, resulting in a PEEP of 2.8, and showing low toxicity for the organisms tested.

REDUCTION IN SUBSTANCES MONITORED

Decrease in ss and oil and grease

Based on company data, in 1995 the plant discharged an average of 5610 m^3/d of effluent, containing notably:

- 15.4 kg/d of oil and grease (O&G)
- 13.5 kg/d of suspended solids (SS)
- 8.8 kg/d of fluorides
- 4.7 kg/d of aluminum

From 1993 to 1995, the concentration of suspended solids decreased by 89%. This decrease was due to a reduction in atmospheric discharges of particles from the potroom lines and plant maintenance.

The oil and grease load has also decreased since January 1998 with the use of synthetic vegetable oil on the casting line.

KEY POINTS

- **Recirculation of alum plant water since September 1992**
- **Sedimentation basin site restoration in 1995**
- **27% reduction in Chimiotox index**

Information updated January 1998

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Saint-Laurent Vision 2000

INDUSTRIAL PLANTS

Highlights

FACT SHEET 61

Stella-Jones Inc.

41 Rodier St.
Delson, Quebec
J0L 1GO

A list of 106 industrial plants has been established under St. Lawrence Vision 2000 (SLV 2000), the second phase of the St. Lawrence Action Plan, launched in 1988. The overall objective is to reduce toxic effluent and virtually eliminate discharges of persistent toxic substances.

The 106 industrial plants designated under SLV 2000 are divided into four groups, each of with a specific objective. The STELLA-JONES INC. plant in Delson, is in Group 1, comprising plants that discharge inadequately treated effluent.

The objective for Group 1 is to reduce toxic effluent discharges in targeted plants by 90%.

INDUSTRIAL PLANT

Wood processing plant

STELLA-JONES INC. acquired the former DOMTAR plant in Delson in December 1993, although DOMTAR still owns the land on which the facility is located. The preservation process in use at the plant involves oil-based products such as creosote, creosote solution, pentachlorophenol (PCP) solution and water-soluble salts in aqueous solutions, namely chromated copper arsenate (CCA). The wood is first dried naturally or in a kiln, then perforated and cut before being treated. Wood that has not been air-seasoned is vacuum processed by steam or boiling. One of two impregnation techniques is used in the steel autoclaves, depending on how much preservative should be retained by the wood. The company plans to install a new CCA autoclave in 1998. The annual capacity of the plant is 26 280 hours for oil-based treatments and 8760 hours for CCA. In 1997, the plant employed a work force of 79.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Wood
- Creosote
- Pentachlorophenol (PCP)
- Heavy oil (solvent for creosote)
- Oil for pole treatment (solvent for PCP)
- Chromated copper arsenate (CCA)

FINISHED PRODUCTS

- Railway ties
- Pilings
- Framing timber
- Structural timber
- Power and telephone poles

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

Low flow

Based on company data, in 1993 the plant discharged 96 m^3/d of effluent, containing notably:

- 16.7 kg/d of chemical oxygen demand (COD)
- 11.3 kg/d of biochemical oxygen demand (BOD_5)
- 3.7 kg/d of suspended solids (SS)
- 0.5 kg/d of oil and grease (O&G)

RESOURCES AND USES TO PRESERVE

Diversity of birds and fish

Effluent from the STELLA-JONES INC. plant is discharged into the Saint-Pierre and Tortue rivers. Both join the south shore of the St. Lawrence River, in the Little La Prairie Basin. This area contains fish spawning sites. At least 14 species of aquatic birds have been recorded between Sainte-Catherine and Brossard. The mouth of the Tortue river is a water bird area also used by waterfowl during nesting and migration. It is also used for sport fishing and pleasure boating. The area between the mouths of the Saint-Régis and Saint-Jacques rivers is part of a commercial fishing zone for carp and yellow sturgeon.

ENVIRONMENTAL DISCHARGE OBJECTIVES

Environmental protection

Environmental discharge objectives are established to preserve local resources and uses. These guidelines, expressed as maximum permissible loads and concentrations for effluent released into the environment, are used in choosing treatment methods which best promote environmental protection. There are no environmental discharge objectives for STELLA-JONES INC.

EFFLUENT TREATMENT

Oil separation

Wastewater from processes using creosote and PCPs is treated in a number of stages. Oil is first separated from water in three primary settling tanks. The oil thus recovered is dehydrated and reused. The water is channelled to the separator, which removes floating oils, and then to the flocculation system, which removes emulsified oils. The water next flows through a sand filter and two columns of activated charcoal before being discharged into the Saint-Pierre river. Wastewater from CCA processing is recirculated within the process.

Domestic sewage, boiler purge water and water softener regeneration water is discharged into the public sewer system and treated at the Sainte-Catherine sewage treatment plant.

Runoff from the land on which the STELLA-JONES INC. plant is located and treated wood leachate currently flow untreated into the Tortue and Saint-Pierre rivers.

PREVENTION AND CLEANUP MEASURES IMPLEMENTED

Containment of contaminated soil and recycling of oils

Since the plant was sold to STELLA-JONES INC., DOMTAR has removed some of the contaminated soil from the drainage areas by the autoclave outlets and stored some of this soil in a watertight cell. A certificate of authorization was issued on July 22, 1997 for the temporary storage of contaminated soil.

STELLA-JONES INC. installed two containment tanks in the spring of 1994 to be used in the event of an accidental spill and a drainage area at the outlets of the oil-based treatment autoclaves. Since August 1994, oil-based process condensates have been stored in two reservoirs, then reused in the boiler.

REGULATORY COMPLIANCE - WATER COMPONENT

Municipal bylaw

The STELLA-JONES INC. plant in Delson is subject to Delson municipal bylaws on discharge into the local sewer system. After treatment, its process water is channelled to the Saint-Louis river.

POLLUTION ABATEMENT

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

Mainly dioxins and furans

The Chimiotox index gauges the load of all toxic substances present in industrial effluent using toxicity factors assigned to each contaminant. It is used, among other things, to monitor discharge trends over the years (Figure 1) and determine the toxic contribution of each pollutant (Table 1).

Table 1 gives SLV 2000 characterization data collected in October 1997, assuming an effluent flowrate of 625 m^3/d originating from process water and indirect cooling water from the air purification system. Six substances were selected in testing for more than 120. According to these data, dioxins and furans, expressed as 2,3,7,8-T_4CDD equivalents, account for 73% of the Chimiotox index.

Figure 1 is plotted from 1997 SLV 2000 characterization data. The Chimiotox index calculated from these data was reported unchanged for 1993 to 1998. No major changes were made to the wastewater treatment process during that period.

Table 1 ***Chimiotox Index (1997)- Stella-Jones Inc.****

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
2,3,7,8-T_4CDD equivalent	$8.874X10^{-10}$	71 428 571 429	63
Total oil and grease	0.100	100	10
Acrolein	0.021	333	7
Total arsenic	$6.2X10^{-5}$	57 143	4
Nitrites-nitrates	0.182	5	1
Total aluminum	0.111	11	1
INDICE CHIMIOTOX			**86**

*Assuming an effluent flowrate of 625 m3/d (6 substances selected in testing for more than 120).

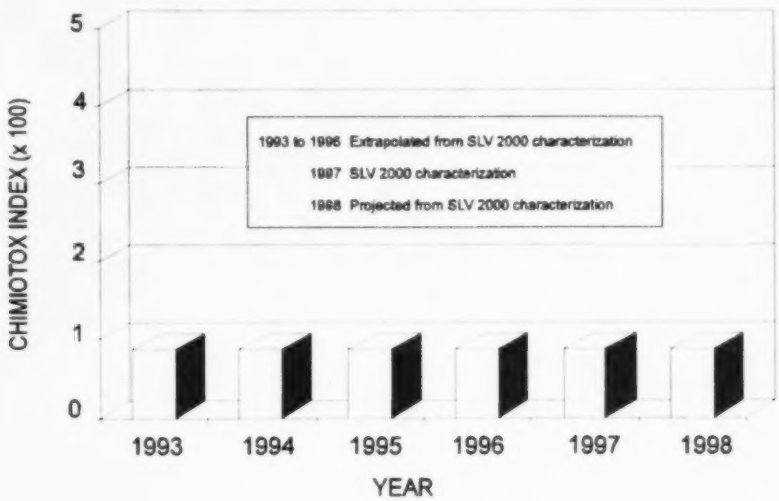

Figure 1 ***Chimiotox Index Trends (1993 to 1998) Stella-Jones Inc.***

VIRTUAL ELIMINATION OF PERSISTENT TOXIC SUBSTANCES

One long-range objective of SLV 2000 is the virtual elimination of eleven persistent and bioaccumulative toxic substances from the effluent of the 106 priority plants along the St. Lawrence and its tributaries. The targeted substances are those designated by the International Joint Commission in August 1993: PCBs, DDT, dieldrin, toxaphene, dioxins, furans, mirex, mercury, lead alkyls, benzo(*a*)pyrene and hexachlorobenzene. To reach this objective, Protection has fixed the environmental discharge objectives set for applicable substances as its target by the end of SLV2000 in 1998, thereby ensuring that all uses of the receiving environment are protected.

The 1997 SLV 2000 characterization detected the presence of dioxins and furans, expressed as 2,3,7,8-T_4CDD equivalents. There are no environmental discharge objectives for STELLA-JONES INC.

PEEP TOXICITY REDUCTION

No toxicity observed

The Potential Ecotoxic Effects Probe (PEEP) combines the results of six standardized bioassays measuring the toxic effects of effluent. The results are expressed on a logarithmic scale of increasing toxicity ranging from 1 to 10 and are used to monitor discharge trends over the years. In the case of the STELLA-JONES INC. plant in Delson, a series of bioassays was conducted in 1997, yielding a PEEP of less than 0.6, and showing no toxicity for the organisms tested.

REDUCTION IN SUBSTANCES MONITORED

Reduction in flowrate and charges

According to SLV 2000 characterization data, in 1997 effluent consisting of process wastewater had a flowrate of 18.1 m^3/d, containing notably:

- 6.8 kg/d of chemical oxygen demand (COD)
- 4.4 kg/d of biochemical oxygen demand (BOD_5)
- 0.2 kg/d of suspended solids (SS)
- 0.1 kg/d of oil and grease (O&G)

Between 1993 and 1997, the effluent flowrate decreased by 81%, the COD by 59%, the BOD_5 by 61%, and SS and O&G loads by 95% and 80% respectively.

KEY POINTS

- **No toxicity for the organisms tested**

Information updated January 1998

ADDITIONAL INFORMATION

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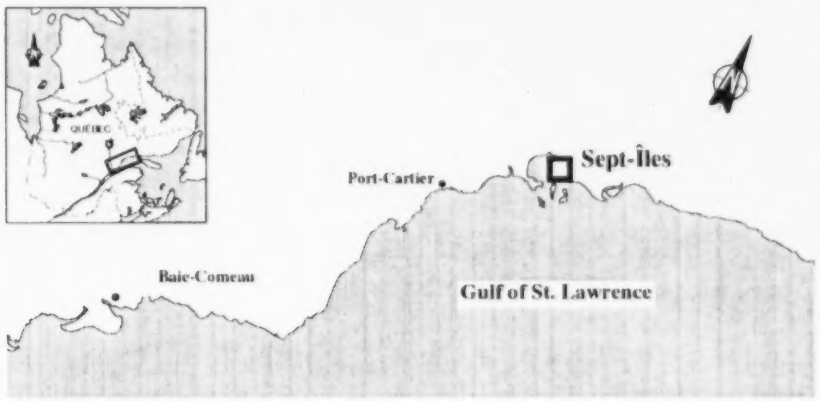
INDUSTRIAL PLANTS

Highlights

FACT SHEET 62

Aluminerie Alouette Inc.

400 de la Pointe-Noire
Sept-Îles, Quebec
G4R 5M9



A list of 106 industrial plants has been established under St. Lawrence Vision 2000 (SLV 2000), the second phase of the St. Lawrence Action Plan, launched in 1988. The overall objective is to reduce toxic effluent and virtually eliminate discharges of persistent toxic substances.

The 106 industrial plants designated under SLV 2000 are divided into four groups, each with a specific objective. The ALUMINERIE ALOUETTE INC. plant in Sept-Îles is in Group 2, comprising plants that have already implemented treatment programs but whose effluent may contain toxic substances.

The objective for Group 2 is maximum reduction of toxic effluent of targeted plants.

INDUSTRIAL PLANT

Aluminum casting

Since June 1992, the ALUMINERIE ALOUETTE INC. plant in Sept-Îles has been casting aluminum ingots and pigs. The plant includes an anode facility as well as electrolysis and casting units. In the anode facility, a vibrating compactor operating in a vacuum forms green anodes of coke and pitch which are then baked in a high-temperature furnace. The annual production capacity is 117 000 t of prebaked anodes. The aluminum is produced by electrolysis of alumina in electrolysis tanks using the Hall-Héroult process. The liquid metal settles on the bottom of the tanks and is then conveyed to the holding furnace in the casting unit. Two ingot moulds and a carousel are used to cast the finished product. The annual production capacity of the plant is 215 000 t of aluminum. In 1997, the plant operated at 101% design capacity and employed a work force of 549.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Alumina
- Aluminum fluoride
- Calcium fluoride
- Coke
- Pitch

FINISHED PRODUCTS

- Aluminum
- Prebaked anodes

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

Fluorides

Based on 1994 company data, in 1993 the plant discharged an average of 2252 m^3/d of effluent (rainwater only), containing notably:

- 759 kg/d of dissolved solids (DS)
- 55.9 kg/d of chemical oxygen demand (COD)
- 13 kg/d of suspended solids (SS)
- 7.39 kg/d of fluorides
- 1.95 kg/d of aluminum
- 0.13 kg/d of zinc

RESOURCES AND USES TO PRESERVE

Diversified fishing resources

The ALUMINERIE ALOUETTE INC. plant is located on the Marconi peninsula, on the southwest side of Sept Îles bay about 6 km from the city of Sept-Îles. The plant's rainwater outfall ends at the bay entrance off Pointe à la Marmite. Sept Îles bay is an expanse of water covering about 100 km^2. Current circulation patterns show net water transport counterclockwise into the bay on the Sept-Îles side and out of the bay on the Pointe à la Marmite side.

A number of fish species are found in Sept Îles bay and in the waters around Pointe à la Marmite, among them herring, capelin and smelt. However, commercial fishing takes place only in the northern part of the bay and around the Sept Îles islands. Lobster is found in Anse aux Rats and around the islands. Of the sea mammals inhabiting the region, only minke whale and harbour porpoise regularly come into the bay. Minke whales are often sighted close to Pointe à la Marmite; harbour porpoises seem to prefer nearby deeper waters. These mammals thrive mainly on capelin, which is abundant in Sainte-Marguerite bay. A small colony of harbour seals used to frequent the Pointe Noire and Pointe à la Marmite area, but is now dispersed and only three or four individual seals are observed in summer.

ENVIRONMENTAL DISCHARGE OBJECTIVES

Environmental protection

Environmental discharge objectives are established to preserve local resources and uses. These guidelines, expressed as maximum permissible loads and concentrations for effluent released into the environment, are used in choosing treatment methods which best promote environmental protection. Environmental discharge objectives for ALUMINERIE ALOUETTE INC. have been calculated and are available on request.

EFFLUENT TREATMENT

No industrial effluent discharges

The ALUMINERIE ALOUETTE INC. plant does not discharge industrial effluent; all process water is recirculated or evaporated. Rainwater is channelled to a 40 000-m^3 settling basin before being discharged into the Gulf of St. Lawrence. Domestic sewage is channelled to a wastewater treatment plant (aerated ponds) built by the city of Sept-Îles for the aluminum works.

PREVENTION AND CLEANUP MEASURES IMPLEMENTED

No modifications

Ten certificates of authorization were issued for construction of the plant. Work began in September 1989 and ended in December 1992. The cleanup measures introduced when the plant was built have made it possible to comply with the requirements of the certificate of authorization issued for operation of the plant. No major changes were made between 1993 and 1998.

REGULATORY COMPLIANCE - WATER COMPONENT

Discharge criteria met

The ALUMINERIE ALOUETTE INC. plant in Sept-Îles meets discharge criteria in the certificate of authorization to operate the plant issued by the Ministère de l'Environnement du Québec (MENVIQ) in May 1992. The standards of the certificate of authorization are comparable to the environmental discharge objectives calculated.

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

Low Chimiotox index

The Chimiotox index gauges the load of all toxic substances in industrial effluent using toxicity factors assigned to each contaminant. It is used, among other things, to monitor discharge trends over the years (Figure 1) and determine the toxic contribution of each pollutant (Table 1).

Table 1 gives SLV 2000 characterization data collected in November 1995 along with the Chimiotox values calculated from them, assuming an effluent flowrate of 1706 m^3/d. Six substances were selected in testing for more than 120. The Chimiotox index obtained is among the lowest of those of the 106 SLV 2000 plants.

Figure 1 is plotted from the 1995 SLV 2000 characterization data. The Chimiotox index calculated from these data was reported unchanged for 1993 to 1998. No major modifications to the process or the wastewater cleanup system were made during this period.

Table 1 ***Chimiotox Index (1995) - Aluminerie Alouette Inc.****

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
Total oil and grease	0.708	100	71
Total phosphorus	0.289	50	14
Total aluminum	0.604	11	7
Total iron	1.198	3.3	4
Nitrites-nitrates	0.509	5	3
Total zinc	0.043	9.4	<1
CHIMIOTOX INDEX			**100**

* Assuming an effluent flowrate of 1706 m^3/d (6 substances selected in testing for more than 120).

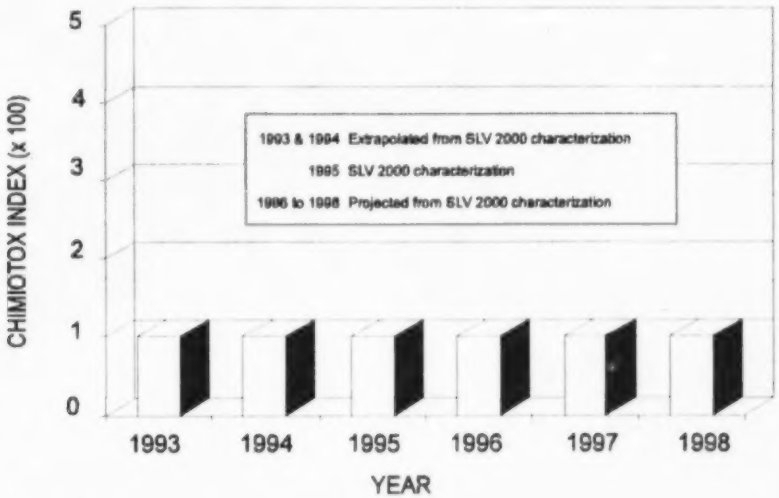


Figure 1 ***Chimiotox Index Trends (1993 to 1998) Aluminerie Alouette Inc.***

VIRTUAL ELIMINATION OF PERSISTENT TOXIC SUBSTANCES

One long-range objective of SLV 2000 is the virtual elimination of eleven persistent and bioaccumulative toxic substances from the effluent of the 106 priority plants along the St. Lawrence and its tributaries. The targeted substances are those designated by the International Joint Commission in August 1993: PCBs, DDT, dieldrin, toxaphene, dioxins, furans, mirex, mercury, lead alkyls, benzo(a)pyrene and hexachlorobenzene. To reach this objective, Protection has fixed the environmental discharge objectives set for applicable substances as its target by the end of SLV 2000 in 1998, thereby ensuring that all uses of the receiving environment are protected.

None of the eleven persistent and bioaccumulative toxic substances were detected in plant effluent during the 1995 SLV 2000 characterization.

PEEP TOXICITY REDUCTION

Non-toxic effluent

The Potential Ecotoxic Effects Probe (PEEP) combines the results of six standardized bioassays measuring the toxic effects of effluent. Results are expressed on a logarithmic scale of increasing toxicity ranging from 1 to 10 and are used to monitor discharge trends over the years. In the case of the ALUMINERIE ALOUETTE INC. plant, a series of bioassays was carried out in 1995; yielding a PEEP of less than 1.2, and showing no toxicity for the organisms tested.

REDUCTION IN SUBSTANCES MONITORED

Stable loads

According to company data, in 1997 the plant discharged an average of 1717 m^3/d of effluent (rainwater only), containing notably:

- 629 kg/d of dissolved solids (DS)
- 53.4 kg/d of chemical oxygen demand (COD)
- 8.3 kg/d of suspended solids (SS)
- 7.9 kg/d of fluorides
- 0.6 kg/d of aluminum
- 0.04 kg/d of zinc

Effluent flowrate and loads of compounds present in the rainwater remained relatively stable between 1993 and 1997.

KEY POINTS

- **One of the lowest Chimiotox index of SLV 2000 plants**
- **No industrial effluent discharged (only excess rainwater)**
- **Non-toxic effluent**

Information updated January 1998

ADDITIONAL INFORMATION

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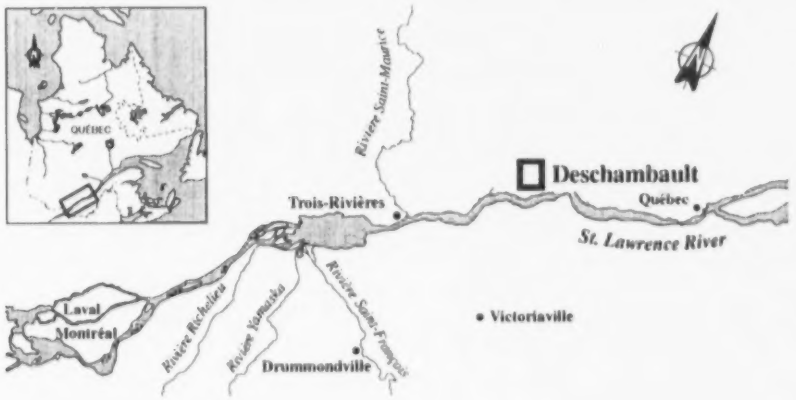
Ministère de l'Environnement et de la Faune

FACT SHEET 63

Aluminerie Lauralco Inc.

1 Sources Blvd.
Deschambault, Quebec
G0A 1S0



A list of 106 industrial plants has been established under St. Lawrence Vision 2000 (SLV 2000), the second phase of the St. Lawrence Action Plan, launched in 1988. The overall objective is to reduce toxic effluent and virtually eliminate discharges of persistent toxic substances.

The 106 industrial plants designated under SLV 2000 are divided into four groups, each with a specific objective. The ALUMINERIE LAURALCO INC. plant, in Deschambault, is in Group 2, comprising plants that have already implemented treatment programs but whose effluent may contain toxic substances.

The objective for Group 2 is maximum reduction of toxic effluent of targeted plants.

INDUSTRIAL PLANT

A modern aluminum smelter

The ALUMINERIE LAURALCO INC. smelter in Deschambault produces aluminum ingots. The facility includes carbon and electrolysis shops and a foundry. In the carbon shop, coke and pitch anodes are shaped on a paste lathe, then baked in an oven. A steel bar is attached to the anode to conduct electricity. Cell linings are replaced in the carbon shop. Alumina is transformed into aluminum in 264 cells with Pechiney prebaked anodes in the electrolysis shop. Molten aluminum is then channelled into three holding furnaces near the foundry. Two pits are used to form the aluminum into T-shaped ingots. The rated production capacity of the plant is 270 000 t/yr. In 1997, the plant operated at 87% capacity.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Alumina
- Coke
- Pitch
- Aluminum fluoride
- Cast iron

FINISHED PRODUCT

- Aluminum in T-ingots

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

Presence of fluorides

In 1993, there were 29 rainwater discharge days at ALUMINERIE LAURALCO INC. Based on company data, the plant discharged an average effluent of 2413 m^3/d, containing notably:

- 522 kg/d of dissolved solids (DS)
- 19.2 kg/d of chemical oxygen demand (COD)
- 16.9 kg/d of fluorides
- 3.6 kg/d of suspended solids (SS)
- 0.56 kg/d of aluminum

RESOURCES AND USES TO PRESERVE

Farming area

The ALUMINERIE LAURALCO INC. storm sewer drains into Pinière Brook. The 2.5 km brook flows into the Bélisle River, halfway between the river source and the St. Lawrence. The Bélisle River encircles much of the plant site before joining the St. Lawrence at Deschambault. The main fish species found are walleye and brook trout. A walleye spawning ground lies at the junction of the river and the St. Lawrence. No drinking water intakes are located along the river. The Bélisle River drainage basin in contains forests interspersed with farmlands. Several gravel pits are also found in the region.

ENVIRONMENTAL DISCHARGE OBJECTIVES

Environmental protection

Environmental discharge objectives are established to preserve local resources and uses. These guidelines, expressed as maximum permissible loads and concentrations for effluent released into the environment, are used in choosing treatment methods which best promote environmental protection. The environmental discharge objectives for ALUMINERIE LAURALCO INC. have been calculated and are available on request.

EFFLUENT TREATMENT

No industrial sewage disposal

Under normal circumstances, no industrial wastewater is discharged from ALUMINERIE LAURALCO INC. in Deschambault. Cooling water for anodes and aluminum ingots is recirculated. Anode cooling line purge water is completely evaporated. Water used to purge ingot cooling lines is evaporated, condensed and recirculated. Process water lines are designed to recirculate water from blind drains, service station rainwater and runoff from the washing of motor vehicles.

The only water discharged from the ALUMINERIE LAURALCO INC. plant is rainwater runoff. It is first cleaned in sand and in coalescing filters. If there is much rainfall, runoff may exceed the amount needed for the plant's processes and overflow into the environment. The water then settles and, if necessary, undergoes reverse osmosis or ion exchange before being discharged. Domestic sewage is discharged to the Deschambault sewage treatment plant.

Industrial water is obtained from rainwater collected on the plant's land to reduce drinking water consumption.

PREVENTION AND CLEANUP MEASURES IMPLEMENTED

A $20 million investment

Some modifications have been made to the original design of the water treatment system. Work since 1993 has been aimed at improving the raw paste shop and reducing the risk of contamination from runoff. In August 1994, changes were made to the plant's air compressor cooling systems to reduce the use of cooling water. The entire water management system, including adjustments and modifications during construction and after the system was commissioned, represent an investment of about $20 million.

REGULATORY COMPLIANCE - WATER COMPONENT

Compliance with discharge criteria

ALUMINERIE LAURALCO INC. in Deschambault meets the discharge criteria in the agreement between the plant and the Ministère de l'Environnement et de la Faune du Québec (MEF) drafted in December 1991. The agreement is part of the certificate of authorization for operations of the plant issued by the MEF in February 1992.

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

Very low Chimiotox Index

The Chimiotox index gauges the load of all toxic substances present in industrial effluent using the toxicity factors assigned to each contaminant. It is used, among other things, to monitor discharge trends over the years (see Figure 1) and determine the toxic contribution of each pollutant (see Table 1).

Table 1 shows June 1995 SLV 2000 characterization data along with the Chimiotox values estimated from them, assuming an effluent flowrate of 2532 m^3/d. Four substances were selected in testing for more than 120. Based on these data, total iron accounts for 38% of the Chimiotox index.

Figure 1 is plotted from 1995 SLV 2000 characterization data. The Chimiotox index calculated from the SLV 2000 characterization data was reported unchanged for 1993 to 1998. It is one of the lowest in SLV 2000, despite the fact that some discharge comes from the natural environment.

Table 1 ***Chimiotox Index (1995) - Aluminerie Lauralco Inc.****

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
Total iron	3.901	3.3	13
Nitrites-nitrates	1.908	5	10
Total manganese	0.665	10	7
Total phosphorus	0.082**	50	4
CHIMIOTOX INDEX			**34**

* Assuming an effluent flowrate of 2532 m^3/d (4 substances selected in testing for more than 120).

** Load calculation based on analytical data which are near methodological detection limits.

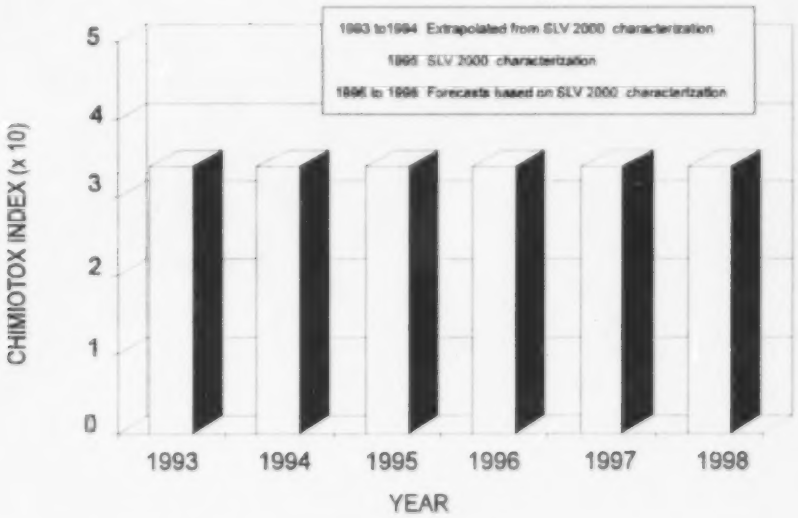


Figure 1 ***Chimiotox Index Trends 1993 to 1998 Aluminerie Lauralco Inc.***

VIRTUAL ELIMINATION OF PERSISTENT TOXIC SUBSTANCES

One long-range objective of SLV 2000 is the virtual elimination of eleven persistent and bioaccumulative toxic substances from the effluent of 106 priority plants along the St. Lawrence and its tributaries. The targeted substances are those designated by the International Joint Commission in August 1993: PCBs, DDT, dieldrin, toxaphene, dioxins, furans, mirex, mercury, lead alkyls, benzo(*a*)pyrene and hexachlorobenzene. To reach this objective, Protection has fixed the environmental discharge objectives set for applicable substances as its target by the end of SLV 2000 in 1998, thereby ensuring that all uses of the receiving environment are protected.

Based on 1995 SLV 2000 characterization data, none of the eleven persistent and bioaccumulative toxins were detected in effluent from ALUMINERIE LAURALCO INC.

PEEP TOXICITY REDUCTION

Non-toxic effluent

The Potential Ecotoxic Effects Probe, or PEEP, combines the results of six standardized bioassays measuring the toxic effects of effluent. The results are expressed on a logarithmic scale of increasing toxicity ranging from 1 to 10 and are used to monitor discharge trends over the years. In the case of ALUMINERIE LAURALCO INC. in Deschambault, a series of bioassays was carried out in 1995, yielding a PEEP of less than 1.2, and showing no toxicity for the organisms tested.

REDUCTION IN SUBSTANCES MONITORED

Reduction in loads

There were 66 rainwater discharge days at ALUMINERIE LAURALCO INC. in 1997. Based on company data, in 1997 the plant discharged an average of 1636 m^3/d of effluent, containing notably:

- 9.0 kg/d of fluorides
- 0.18 kg/d of aluminum

From 1993 to 1997 during periods of rainwater discharge, the fluoride load decreased by 47% while the aluminum load dropped by 68%.

KEY POINTS

- **Chimiotox index one of the lowest in SLV 2000**
- **No industrial wastewater discharge (surplus rainwater only)**
- **Water management system: a $20 million investment**
- **Non-toxic effluent**

Information revised January 1998

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Saint-Laurent Vision 2000

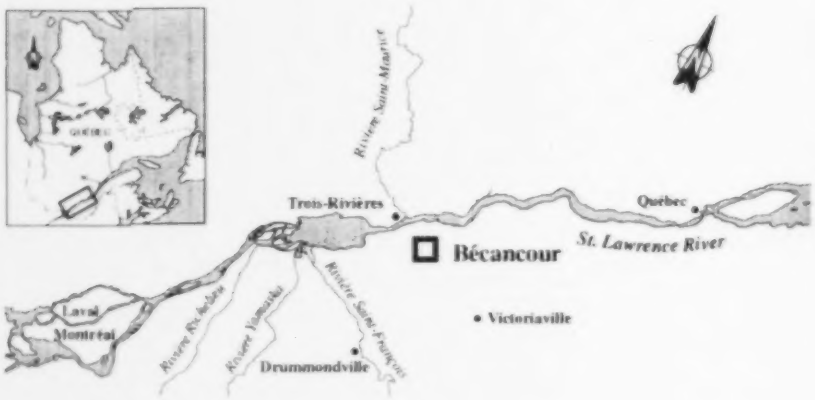
INDUSTRIAL PLANTS

Highlights

FACT SHEET 64

Chemprox Chemicals Inc.

655 Alphonse-Deshaies Blvd.
Bécancour, Quebec
G0X 1B0



A list of 106 industrial plants has been established under St. Lawrence Vision 2000 (SLV 2000), the second phase of the St. Lawrence Action Plan, launched in 1988. The overall objective is to reduce toxic effluent and virtually eliminate discharges of persistent toxic substances.

The 106 industrial plants designated under SLV 2000 are divided into four groups, each with a specific objective. The CHEMPROX CHEMICALS INC. plant in Bécancour is in Group 2, comprising plants that have already implemented treatment measures but whose effluent may contain toxic substances.

The objective for Group 2 is maximum reduction of toxic effluent of targeted plants.

INDUSTRIAL PLANT

Hydrogen peroxide plant

The CHEMPROX CHEMICALS INC. plant in Bécancour produces hydrogen peroxide in a three-stage process. Quinone dissolved in a solution of organic solvents is first hydrogenated in the presence of a catalyst to form hydroquinone. The hydroquinone is oxidized in air and an aqueous solution of hydrogen peroxide is obtained by water extraction. The quinone released is recycled. Annual production capacity of the plant is 73 000 t. In 1997, the company increased its annual production capacity to 73 000 t and the plant directly and indirectly employed a work force of 50.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Anthraquinone
- Hydrogenation catalyst
- Aromatic solvent
- Hydrogen
- Polar solvent

FINISHED PRODUCT

- Hydrogen peroxide (35%, 50% and 70%)

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

Low charges

Based on company data for 1993, the plant discharged 206 m^3/d of effluent, containing notably:

- 41 kg/d of total organic carbon (TOC)
- 14.6 kg/d of suspended solids (SS)
- 0.3 kg/d of trimethylbenzene

RESOURCES AND USES TO PRESERVE

Rich and diversified habitat

The CHEMPROX CHEMICALS INC. plant is located in the Bécancour Industrial Park on the shores of the St. Lawrence, in an area where the natural complexity of the river results in a wide variety of wildlife habitats. The infralittoral area facing the park contains water plant communities. A large mud flat rises in the middle of the St. Lawrence immediately downstream from the Bécancour wharf. The water plant communities in the area are considered attractive spawning and nursery areas for northern pike, perch, brown bullhead and smallmouth bass. Over 70 fish species and at least 26 species of water birds may be found in the vicinity. Hunting and fishing enthusiasts visit the Bécancour area and sport fishing and trapping are particularly popular around the mouth of the Gentilly River. The nuclear power plant draws drinking water and industrial water a short distance downstream from the Bécancour wharf.

ENVIRONMENTAL DISCHARGE OBJECTIVES

Environmental protection

Environmental discharge objectives are established to preserve local resources and uses. These guidelines, expressed as maximum permissible loads for effluent released into the environment, are used in choosing treatment methods which best promote environmental protection. Environmental discharge objectives for CHEMPROX CHEMICALS INC. have been calculated and are available on request.

EFFLUENT TREATMENT

Biological treatment

Industrial effluent is first neutralized and then channelled to the aerobic biological treatment system, the sludge from which is recirculated. The effluent then undergoes sedimentation before being sampled and discharged into the St. Lawrence. Domestic sewage is discharged into the municipal sewer system.

PREVENTION AND CLEANUP MEASURES IMPLEMENTED

Plant expansion project

CHEMPROX CHEMICALS INC. has begun construction work to enlarge the plant to increase the annual production capacity to 73 000 t and clean up liquid effluents. This work has been completed at the beginning of 1997. The project was aimed at reducing the discharge load per tonne of hydrogen peroxide produced.

REGULATORY COMPLIANCE - WATER COMPONENT

Standards met

The CHEMPROX CHEMICALS INC. plant in Bécancour is subject to the standards in the certificate of authorization issued on January 21, 1997. The company complies with all applicable standards.

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

Mainly nitrites and nitrates

The Chimiotox index gauges the load of all toxic substances in industrial effluent using toxicity factors assigned to each contaminant. It is used, among other things, to monitor discharge trends over the years (Figure 1) and determine the toxic contribution of each pollutant (Table 1).

Table 1 gives data from the SLV 2000 characterization carried out in August 1995 along with Chimiotox values estimated from them, assuming an effluent flowrate of 337 m^3/d. Eleven substances were selected in testing for more than 120. Based on these data, nitrites and nitrates account for 53% of the Chimiotox index.

Figure 1 is plotted from 1995 SLV 2000 characterization data. The Chimiotox values estimated from these data were reported unchanged for 1993 to 1998. The impact of the changes made by the company to its process in 1997 has not been quantified and does not appear in the figure.

Table 1 ***Chimiotox Index (1995) - Chemprox Chemicals Inc.****

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
Nitrites-nitrates	36.436	5	182
Total phosphorus	0.867	50	43
Total cyanides	0.174	200	35
Total arsenic	0.001**	57 143	32
Total oil and grease	0.234	100	23
Total mercury	1.4×10^{-4} **	166 667	23
Xylenes	0.140	25	3
Total aluminum	0.131	11	1
Total iron	0.384	3.3	1
Ammonia nitrogen	0.255**	0.8	<1
Total zinc	0.052	9.4	<1
CHIMIOTOX INDEX			**343**

* Assuming an effluent flowrate of 337 m^3/d (11 substances selected in testing for more than 120).

** Load calculation based on analytical data which are near methodological detection limits.

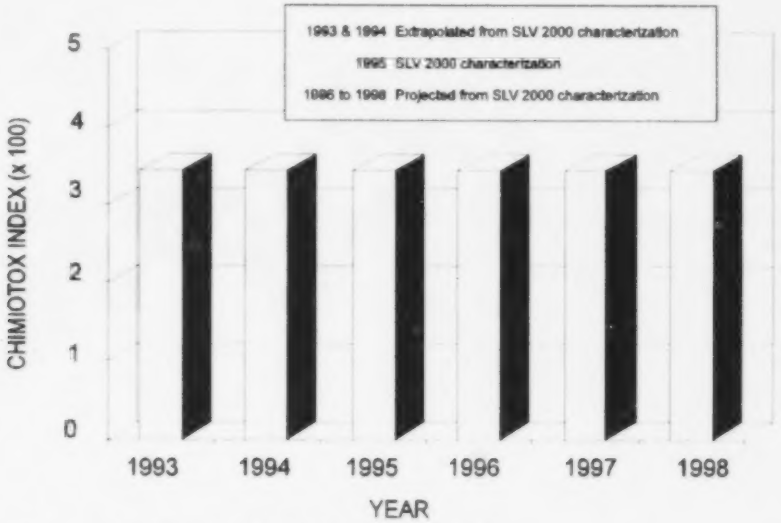


Figure 1 ***Chimiotox Index Trends (1993 to 1998) Chemprox Chemicals Inc.***

VIRTUAL ELIMINATION OF PERSISTENT TOXIC SUBSTANCES

One long-range objective of SLV 2000 is the virtual elimination of eleven persistent and bioaccumulative toxic substances from the effluent of 106 priority plants along the St. Lawrence and its tributaries. The targeted substances are those designated by the International Joint Commission in August 1993: PCBs, DDT, dieldrin, toxaphene, dioxins, furans, mirex, mercury, lead alkyls, benzo(*a*)pyrene and hexachlorobenzene. To reach this objective, Protection has fixed the environmental discharge objectives set for applicable substances as its target by the end of SLV 2000 in 1998, thereby ensuring that all uses of the receiving environment are protected.

The 1995 SLV 2000 characterization showed that a very small quantity of mercury was present. No environmental discharge objective has been calculated for this substance.

PEEP TOXICITY REDUCTION

Low toxicity

The Potential Ecotoxic Effects Probe PEEP) combines the results of six standardized bioassays measuring the toxic effects of effluent. The results are expressed on a logarithmic scale of increasing toxicity ranging from 1 to 10 and are used to monitor discharge trends over the years. In the case of CHEMPROX CHEMICALS INC., a series of bioassays was carried out in 1995, yielding a PEEP of 2.9, and showing a low toxicity for the organisms tested.

REDUCTION IN SUBSTANCES MONITORED

Increased production

Based on company data, since the plant reopened in May 1997, it has discharged an average of 646 m^3/d of effluent, containing notably:

- 85 kg/d of total organic carbon (TOC)
- <0.1 kg/d of trimethylbenzene

From 1993 to 1997, the increase in total organic carbon loads was due to an increase in production from 25 600 t/y to 73 000 t/y.

KEY POINTS

- **Aerobic biological treatment in operation**
- **Production capacity increase in 1997 and reduction in loads per tonne of H_2O_2 produced**

Information updated January 1998

ADDITIONAL INFORMATION

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Saint-Laurent Vision 2000

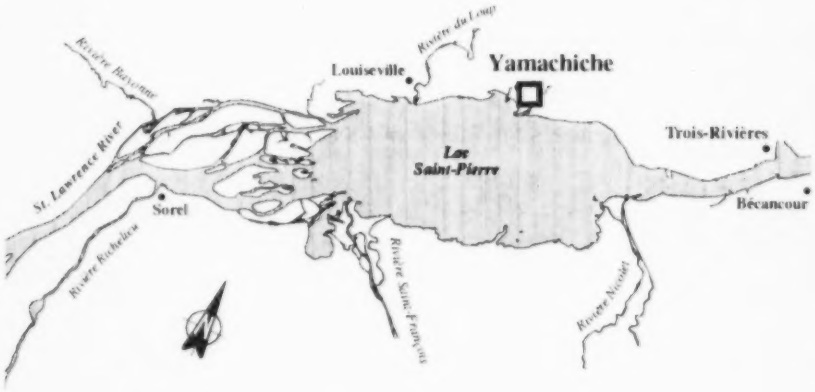
INDUSTRIAL PLANTS

Highlights

FACT SHEET 65

Duchesne & Fils ltée

333 Saint-Jean Street
Yamachiche, Quebec
G0X 3L0



A list of 106 industrial plants has been established under St. Lawrence Vision 2000 (SLV 2000), the second phase of the St. Lawrence Action Plan, launched in 1988. The overall objective is to reduce toxic effluent and virtually eliminate discharges of persistent toxic substances.

The 106 industrial plants designated under SLV 2000 are divided into four groups, each with a specific objective. The DUCHESNE & FILS LTÉE plant, located in Yamachiche, is part of Group 2, comprising the plants that have already implemented treatment programs, but whose effluent may contain toxic substances.

The objective for Group 2 is maximum reduction of toxic effluent discharges in targeted plants.

INDUSTRIAL PLANT

Ferrous metals plant

The DUCHESNE & FILS LTÉE plant in Yamachiche comprises several production units. A major fire in march 1998 has shut down a part of the activities, including the manufacturing of nails, precision nails, wire mesh and metal lath. Wire mesh and metal laths were produced by spot welding and metal expansion. The various steps in nail manufacturing included cleaning, drawing, production, finishing, packing, and storage.

DUCHESNE & FILS LTÉE comprises a steel sheeting plant and an aluminium siding plant where steel sheeting and aluminium are sent to forming units. The company has also a vinyl plant which produces polyethylene film.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Steel sheeting
- Aluminum
- Wire stock
- Polyethylene resin
- PVC resin

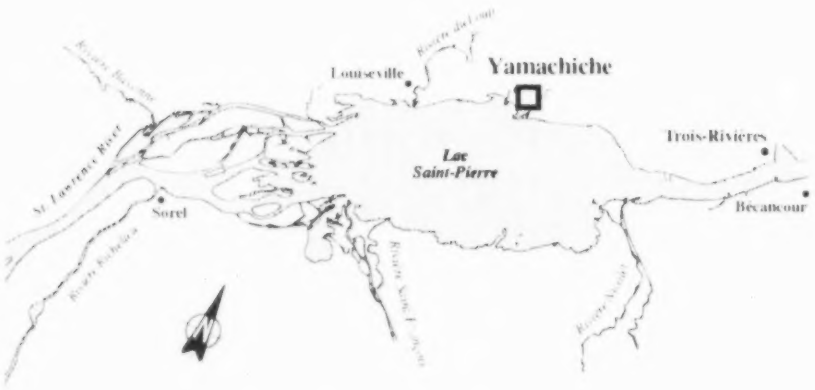
FINISHED PRODUCTS

- Nails
- Profiled steel sheeting
- Aluminum siding
- Vinyl siding
- Wire mesh
- Metal lath
- Polyethylene film

FACT SHEET 65

Duchesne & Fils ltée

333 Saint-Jean Street
Yamachiche, Quebec
G0X 3L0



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INDUSTRIAL PLANT

Ferrous metals plant

The DUCHESNE & FILS LTÉE plant in Yamachiche comprises several production units. A major fire in march 1998 has shut down a part of the activities, including the manufacturing of nails, precision nails, wire mesh and metal lath. Wire mesh and metal laths were produced by spot welding and metal expansion. The various steps in nail manufacturing included cleaning, drawing, production, finishing, packing, and storage.

DUCHESNE & FILS LTÉE comprises a steel sheeting plant and an aluminium siding plant where steel sheeting and aluminium are sent to forming units. The company has also a vinyl plant which produces polyethylene film.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Steel sheeting
- Aluminum
- Wire stock
- Polyethylene resin
- PVC resin

FINISHED PRODUCTS

- Nails
- Profiled steel sheeting
- Aluminum siding
- Vinyl siding
- Wire mesh
- Metal lath
- Polyethylene film

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

Very low discharge

Based on company data, in 1993 effluent discharge was essentially wastewater from pickling operations. The discharge rate was 10.1 m^3/d, containing notably:

- 1.12 kg/d of iron

RESOURCES AND USES TO PRESERVE

Many fish species

Wastewater from the DUCHESNE & FILS LTÉE plant is discharged into the Little Yamachiche river, a few kilometres from its confluence into lake Saint-Pierre. Downstream from the discharge point is a spawning area for walleye, sturgeon and sucker. The Little Yamachiche river is also an eel fattening area. The section of the river south of Highway 40 is a conservation and development zone for the north shore of lake Saint-Pierre. In springtime, it serves as a staging area for migrating waterfowl.

ENVIRONMENTAL DISCHARGE OBJECTIVES

Environmental protection

Environmental discharge objectives are established to preserve local resources and uses. These guidelines, expressed as maximum permissible loads and concentrations for effluent released into the environment, are used in choosing treatment methods which best promote environmental protection. There are no environmental discharge objectives for DUCHESNE & FILS LTÉE as the plant no longer discharges industrial wastewater.

EFFLUENT TREATMENT

Zero discharge

The new mechanical descaling process does not produce industrial wastewater. Until the burn down of part of the units in March 1998, indirect cooling water were treated in three aerated ponds. Domestic sewage and drainage waters are also treated in those three aerated ponds.

PREVENTION AND CLEANUP MEASURES IMPLEMENTED

Mechanical descaling process

Until November 1995, industrial wastewater produced by the pickling process was treated before being discharged into the Little Yamachiche river. It was sent to neutralization, iron precipitation and settling. Acid solutions were recovered and the sludge was filtered, then discharged. In November 1995, pickling was replaced by a new mechanical descaling process. The company has invested $1 million in this operation.

REGULATORY COMPLIANCE - WATER COMPONENT

Compliance with standards

DUCHESNE & FILS LTÉE meets the standards set by the certificate when it produces effluent.

POLLUTION ABATEMENT

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

No characterization

The Chimiotox index gauges the load of all toxic substances present in industrial effluent using the toxicity factors assigned to each contaminant. It is used, among other things, to monitor discharge trends over the years and determine the toxic contribution of each pollutant.

There has been no characterization of effluent under SLV 2000 since the DUCHESNE & FILS LTEE plant no longer discharges industrial wastewater.

Table 1 ***Chimiotox Index - Duchesne & Fils ltée***

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
Since the DUCHESNE & FILS LTÉE plant no longer discharges industrial wastewater, no exhaustive characterization has been carried out and the Chimiotox index for this company cannot be calculated.			
CHIMIOTOX INDEX			**N/A**

VIRTUAL ELIMINATION OF PERSISTENT TOXIC SUBSTANCES

One long-range objective of SLV 2000 is the virtual elimination of eleven persistent bioaccumulative toxic substances from the effluent of 106 priority plants located on the St. Lawrence and its tributaries. The targeted substances are those designated by the International Joint Commission in August 1993: PCBs, DDT, dieldrin, toxaphene, dioxins, furans, mirex, mercury, lead alkyls, benzo(*a*)pyrene and hexachlorobenzene. To reach this objective, Protection has fixed the environmental discharge objectives set for applicable substances as its target by the end of SLV 2000 in 1998, thereby ensuring that all uses of the receiving environment are protected.

Since industrial wastewater is no longer discharged, no characterization has been done.

PEEP TOXICITY REDUCTION

No PEEP

The Potential Ecotoxic Effects Probe, or PEEP, combines the results of six standardized bioassays measuring the toxic effects of effluent. The results are expressed on a logarithmic scale of increasing toxicity ranging from 1 to 10 and are used to monitor discharge trends over the years. In the case of the DUCHESNE & FILS LTÉE plant, no exhaustive characterization was done.

REDUCTION IN SUBSTANCES MONITORED

Shut down of a part of the activities

Between November 1995 and March 1998, the new mechanical descaling process has been used all the time. Mechanical descaling, in contrast with acid pickling, did not generate liquid effluent. A major fire in March 1998 has shut down a part of the activities.

KEY POINTS

- **In 1995, replacement of pickling with a mechanical descaling process that does not produce liquid effluent; $1 million invested**
- **Shut down of a part of the activities consecutive to a major fire in March 1998**

Information revised March 1998

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Saint-Laurent Vision 2000

INDUSTRIAL PLANTS

Highlights

FACT SHEET 66

Les Emballages Knowlton inc.

315 Knowlton Road
Lake Brome, Quebec
J0E 1V0

A list of 106 industrial plants has been established under St. Lawrence Vision 2000 (SLV 2000), the second phase of the St. Lawrence Action Plan, launched in 1988. The overall objective is to reduce toxic effluent and virtually eliminate discharges of persistent toxic substances.

The 106 industrial plants designated under SLV 2000 are divided into four groups, each with a specific objective. The LES EMBALLAGES KNOWLTON INC. plant in Lake Brome is in Group 2, comprising plants that have already implemented treatment programs but whose effluent may contain toxic substances.

The objective for Group 2 is maximum reduction of toxic effluent of targeted plants.

INDUSTRIAL PLANT

Cosmetic manufacturing and packaging

The CLAIROL CANADA plant purchased by LES EMBALLAGES KNOWLTON INC. on May 6, 1991 manufactures cosmetics. The products are prepared on site by mixing raw materials; no chemical reactions are involved. The raw materials are stored in tanks and fed to stationary or mobile mixing tanks. The production line is organized to suit the product being manufactured. Product quality is checked before packaging. Containers are filled, cased and shipped out. Annual production capacity of the plant is 15 000 t. In 1997, the plant operated at 66% design capacity and employed a work force of 406.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Propylene glycol
- Ethanol
- Liquid silicone
- Detergent bases
- Surfactants
- Lauryl sulphate
- Sulphates

FINISHED PRODUCTS

- Shampoos and conditioners
- Stick and lotion deodorants
- Hair sprays
- Skin lotions
- Moisturizing creams and lotions
- Bubble bath
- Toothpaste

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

Low effluent flowrate

Based on company data, in 1993 the plant discharged 58 m^3/d of effluent, containing notably:

- 91.0 kg/d of chemical oxygen demand (COD)
- 38.9 kg/d of biochemical oxygen demand (BOD_5)
- 14.6 kg/d of suspended solids (SS)

ENVIRONMENTAL DISCHARGE OBJECTIVES

Environmental protection

Environmental discharge objectives are established to preserve local resources and uses. These guidelines, expressed as maximum permissible loads and concentrations for effluent released into the environment, are used in choosing treatment methods which best promote environmental protection. There are no environmental discharge objectives for LES EMBALLAGES KNOWLTON INC. because the effluents are treated at the municipal wastewater treatment plant. However, environmental discharge objectives have been calculated for effluent at the municipal wastewater treatment plant and are used to calculate discharge objectives for the company's effluent.

EFFLUENT TREATMENT

Aerated pond

Industrial effluent is stored in a tank and then transported by vacuum truck to an aerated pond with a capacity of 5682 m^3 (1 250 000 imperial gallons); the pond is equipped with seven diffusers. The treatment reduces chemical oxygen demand by 80% and cuts biochemical oxygen demand to 500 mg/L. From April to November, the treated water is pumped to an aerated pond in the Lake Brome wastewater treatment plant. In winter, industrial effluent stays in the company's aerated pond. The diffusers go into operation in spring; pH is controlled and nutrients are added. The company's facilities also include a 682 m^3 (150 000 imperial gallon) emergency pond. Slightly contaminated water, composed mainly of cooling water, is discharged into Mill Pond stream. Domestic sewage is emptied into the municipal sewer system.

PREVENTION AND CLEANUP MEASURES IMPLEMENTED

Facility closed

In May 1994, the plastic bottle-moulding facility was closed. Six storage tanks and one mixing tank were added.

REGULATORY COMPLIANCE - WATER COMPONENT

Standards met

LES EMBALLAGES KNOWLTON INC. made improvements between November 1980 and December 1982 as part of a wastewater treatment program (PAE). The company meets the standards stipulated by the PAE. Effluent treated at the Lake Brome wastewater treatment plant is subject to municipal bylaws. In december 1997, the company applied for a certificat of authorization (CA) for the entire plant. It will have to comply with the standards stipulated in the CA, which should be issued for 1998.

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

Mainly total oil and grease

The Chimiotox index gauges the load of all toxic substances in industrial effluent using the toxicity factors assigned to each contaminant. It is used, among other things, to monitor discharge trends over the years (Figure 1) and determine the toxic contribution of each pollutant (Table 1).

Table 1 gives SLV 2000 characterization data collected in September 1995 along with the Chimiotox values estimated from them, assuming an effluent flowrate of 44.4 m^3/d. Seventeen substances were selected in testing for more than 120. According to these data, total oil and grease account for 52% of the Chimiotox index, and total mercury accounts for 30%.

Figure 1 was plotted from the SLV 2000 characterization data collected in 1995. The Chimiotox index estimated from the 1995 data was reported unchanged for 1993 to 1998.

Table 1 ***Chimiotox Index (1995) - Les Emballages Knowlton inc.****

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
Total oil and grease	4.902	100	490
Total mercury	0.002	166 667	286
Total sulphides	0.260	500	130
Total phosphorous	0.342	50	17
Diethylphthalate	0.002	5 000	9
Total aluminum	0.353	11	4
Total copper	0.002**	451	1
Ammonia nitrogen	0.007**	0.8	<1
Nitrites-nitrates	0.001**	5	<1
Total iron	0.083	3.3	<1
Total manganese	0.003	10	<1
Total zinc	0.019	9.4	<1
Phenol	0.002	200	<1
1,2-dichlorobenzene	0.001	143	<1
1,3-dichlorobenzene	0.001	400	<1
1,4-dichlorobenzene	0.001	250	<1
Ethylbenzene	0.001	33	<1
CHIMIOTOX INDEX			**947**

* For an effluent flowrate of 44.4 m^3/d (17 substances selected in testing for more than 120).

** Load calculation based on analytical data which are near methodological detection limits.

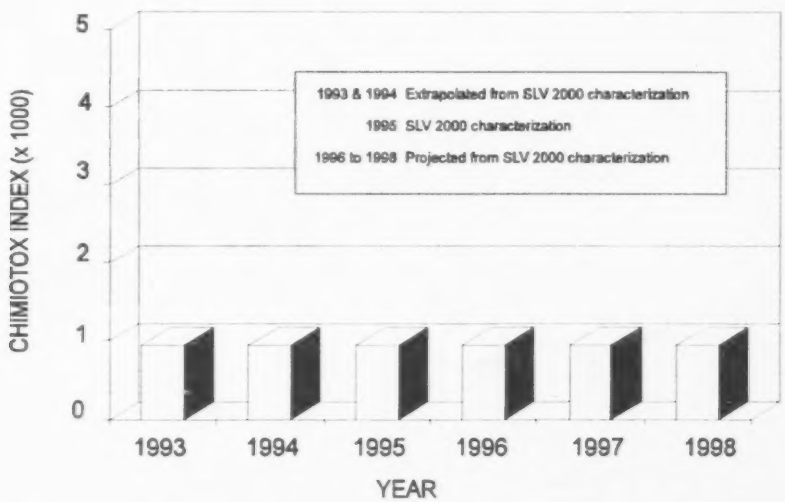

Figure 1 ***Chimiotox Index Trends (1993 to 1998) Les Emballages Knowlton inc.***

VIRTUAL ELIMINATION OF PERSISTENT TOXIC SUBSTANCES

One long-range objective of SLV 2000 is the virtual elimination of eleven persistent and bioaccumulative toxic substances from the effluent of the 106 priority plants along the St. Lawrence and its tributaries. The targeted substances are those designated by the International Joint Commission in August 1993: PCBs, DDT, dieldrin, toxaphene, dioxins, furans, mirex, mercury, lead alkyls, benzo(*a*)-pyrene and hexachlorobenzene. To reach this objective, Protection has fixed the environmental discharge objectives set for applicable substances as its target by the end of SLV 2000 in 1998, thereby ensuring that all uses of the receiving environment are protected.

Mercury was detected during the 1995 SLV 2000 characterization. An environmental discharge objective has been calculed for mercury in the effluent of the municipal wastewater treatment plant. The objective has been set at the threshold of the methodological detection limit of 0.0001 mg/l.

PEEP TOXICITY REDUCTION

Low toxicity

The Potential Ecotoxic Effects Probe, or PEEP, combines the results of six standardized bioassays measuring the toxic effects of effluent. The results are expressed on a logarithmic scale (1 to 10) of increasing toxicity and are used to monitor discharge trends over the years. A series of bioassays of effluent from the LES EMBALLAGES KNOWLTON INC. plant was conducted in 1995; a PEEP index of 1.5 was obtained, indicating low toxicity for the organisms used. In the case of the LES EMBALLAGES KNOWLTON INC. plant, a series of bioassays was conducted in 1995, yelding a PEEP of 1.5 and showing a low toxicity for the organisms tested.

REDUCTION IN SUBSTANCES MONITORED

Increase in organic load

According to company data, in 1997 the plant discharged 65 m^3/d of effluent, containing notably:

- 277 kg/d of chemical oxygen demand (COD)
- 108 kg/d of biochemical oxygen demand (BOD_5)

Figures for suspended solids (ss) are unavaible. Between 1993 and 1997, biochemical oxygen demand increased 179% and chemical oxygen demand 204%.

KEY POINTS

- **Plastic bottle-moulding facility closed in 1994**

Infomation revised January 1998

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INDUSTRIAL PLANTS

Highlights

FACT SHEET 67

Eka Chimie Canada Inc.

640 des Érables
Salaberry-de-Valleyfield,
Quebec
J6T 6G4

A list of 106 industrial plants has been established under St. Lawrence Vision 2000 (SLV 2000), the second phase of the St. Lawrence Action Plan, launched in 1988. The overall objective is to reduce toxic effluent and virtually eliminate discharges of persistent toxic substances.

The 106 industrial plants designated under SLV 2000 are divided into four groups, each with a specific objective. The EKA CHIMIE CANADA INC. plant in Salaberry-de-Valleyfield is in Group 2, comprising plants that have already implemented treatment programs but whose effluent may contain toxic substances.

The objective for Group 2 is maximum reduction of toxic effluent of targeted plants.

INDUSTRIAL PLANT

Sodium chloride production

The EKA CHIMIE CANADA INC. plant in Salaberry-de-Valleyfield produces sodium chlorate. Rock salt dissolved in recycled water is purified by a physico-chemical process. The brine obtained is evaporated and decanted, then centrifuged to concentrate the salt crystals. The salt is next dissolved in a chlorate liquor and mixed with other solutions before entering the reactors. The sodium chlorate generated by electrolysis of the solution is purified, crystallized, and then concentrated by decanting and centrifuging. The plant uses some of the hydrogen released through electrolysis as a source of energy; the surplus is discharged into the air. Hydrogen peroxide at 70% is stored, diluted (35% to 50%) and shipped to customers. Annual production capacity of the plant is 118 560 t of sodium chlorate. In 1997, the plant operated at 100% design capacity and employed a work force of approximately 60.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Sodium chloride
- Hydrochloric acid
- Sodium hydroxide
- Sodium dichromate
- Sodium bicarbonate
- Calcium chloride
- Hydrogen peroxide (70%)

FINISHED PRODUCTS

- Sodium chlorate crystals
- Hydrogen peroxide in solution (35% to 50%)

FACT SHEET 67

Eka Chimie Canada Inc.

640 des Érables

Salaberry-de-Valleyfield,

Quebec

J6T 6G4

***A** list of 106 industrial plants has been established under St. Lawrence Vision 2000 (SLV 2000), the second phase of the St. Lawrence Action Plan, launched in 1988. The overall objective is to reduce toxic effluent and virtually eliminate discharges of persistent toxic substances.*

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The objective for Group 2 is maximum reduction of toxic effluent of targeted plants.

INDUSTRIAL PLANT

Sodium chloride production

The EKA CHIMIE CANADA INC. plant in Salaberry-de-Valleyfield produces sodium chlorate. Rock salt dissolved in recycled water is purified by a physico-chemical process. The brine obtained is evaporated and decanted, then centrifuged to concentrate the salt crystals. The salt is next dissolved in a chlorate liquor and mixed with other solutions before entering the reactors. The sodium chlorate generated by electrolysis of the solution is purified, crystallized, and then concentrated by decanting and centrifuging. The plant uses some of the hydrogen released through electrolysis as a source of energy; the surplus is discharged into the air. Hydrogen peroxide at 70% is stored, diluted (35% to 50%) and shipped to customers. Annual production capacity of the plant is 118 560 t of sodium chlorate. In 1997, the plant operated at 100% design capacity and employed a work force of approximately 60.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Sodium chloride
- Hydrochloric acid
- Sodium hydroxide
- Sodium dichromate
- Sodium bicarbonate
- Calcium chloride
- Hydrogen peroxide (70%)

FINISHED PRODUCTS

- Sodium chlorate crystals
- Hydrogen peroxide in solution (35% to 50%)

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

Mainly dissolved solids

Based on company data, in 1993 the plant discharged 20 580 m^3/d of effluent, containing notably:

- 3900 kg/d of dissolved solids (DS)
- 84 kg/d of suspended solids (SS)
- 0.96 kg/d of chlorates

RESOURCES AND USES TO PRESERVE

Migration route for many fish species

Part of the wastewater from the EKA CHIMIE CANADA INC. plant in Salaberry-de-Valleyfield is treated at the municipal sewage treatment plant. The plant is located on the Beauharnois canal, which is a migration route for many fish species (yellow sturgeon, shad, smallmouth bass, perch, white sucker and longnose sucker, whitenose sucker and shorthead redhorse, cyprinids, etc.). Fishing enthusiasts (pike, perch, walleye) come regularly to the canal, particularly near Highway 132 and in the power plant park near the mouth of the canal. There is a large spawning ground for brown bullhead on the north shore, in the bay upstream from the Saint-Louis-de-Gonzague bridge. Two other spawning grounds are located at the canal entrance and near the locks. The water-plant communities on either side of the bridge are very attractive to waterfowl. A 4200-hectare area has been designated by federal authorities as a rest area for migrating birds. Water for the Beauharnois water supply system is taken on the south shore of the canal, upstream from the dam, about 15 kilometres downstream from the effluent discharge point of the EKA CHIMIE CANADA INC. plant.

ENVIRONMENTAL DISCHARGE OBJECTIVES

Environmental protection

Environmental discharge objectives are established to preserve local resources and uses. These guidelines, expressed as maximum permissible loads and concentrations for effluent released into the environment, are used in choosing treatment methods which best promote environmental protection. Environmental discharge objectives for EKA CHIMIE CANADA INC. have been calculated and are available on request.

EFFLUENT TREATMENT

Process water recirculated

Industrial wastewater from the EKA CHIMIE CANADA INC. plant is recirculated. Sewage and purge water from the cooling towers are discharged into the Salaberry-de-Valleyfield public sewer system and carried to the municipal sewage treatment plant (activated sludge). Primary indirect cooling water is discharged into the municipal storm sewer network, which releases it untreated into the Beauharnois canal. Purge water from the secondary indirect cooling system on the crystallization circuit is re-used as primary cooling water.

PREVENTION AND CLEANUP MEASURES IMPLEMENTED

Groundwater quality measurement

In November 1990, a certificate of authorization was issued to increase the production capacity of the plant; at this time the company installed four groundwater sampling wells. Groundwater quality analyses are carried out on a regular basis. In 1995, the company obtained authorization to modify the sodium chlorate solution purification process. The crystallizer purge process was improved in 1996 and the average flowrate is only 20 m^3/d. The target is 0 m^3/d.

REGULATORY COMPLIANCE - WATER COMPONENT

Standards met

The EKA CHIMIE CANADA INC. plant in Salaberry-de-Valleyfield is subject to and satisfies the standards of the certificate of authorization issued in 1996. A new standard for total residual chlorine is being developed.

POLLUTION ABATEMENT

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

Negative Chimiotox index

The Chimiotox index gauges the load of all toxic substances in industrial effluent using the toxicity factors assigned to each contaminant. It is used, among other things, to monitor discharge trends over the years and determine the toxic contribution of each pollutant.

Table 1 gives data from the characterization carried out in August 1995 under SLV 2000 along with Chimiotox values estimated from them, assuming an effluent flowrate of 28 099 m^3/d. Eleven substances were selected in testing for more than 120.

The Chimiotox index estimated from the characterization under SLV 2000 is negative. Industrial wastewater from the plant is recirculated in the process and effluent discharged into the municipal sewer system is of better quality than the plant's water supply.

Table 1 ***Chimiotox Index (1995) - Eka Chimie Canada Inc.****

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
Total oil and grease	-0.606	100	-61
Nitrites-nitrates	0.104	5	1
Total sulphides	0.049	500	24
Total aluminum	-0.720	11	-8
Total antimony	-0.107	1.6	0
Total beryllium	0.005	15 601	78
Total copper	0.028	451	12
Total iron	-0.202	3.3	-1
Total mercury	-0.002	166 667	-389
Total vanadium	0.301	71	21
Total zinc	-0.339	9.4	-3
CHIMIOTOX INDEX			**-324**

* Assuming an effluent flowrate of 28 099 m^3/d (11 substances selected in testing for over 120).

VIRTUAL ELIMINATION OF PERSISTENT TOXIC SUBSTANCES

One long-range objective of SLV 2000 is the virtual elimination of eleven persistent and bioaccumulative toxic substances from the effluent of the 106 priority plants along the St. Lawrence and its tributaries. The targeted substances are those designated by the International Joint Commission in August 1993: PCBs, DDT, dieldrin, toxaphene, dioxins, furans, mirex, mercury, lead alkyls, benzo(*a*)pyrene and hexachlorobenzene. To reach this objective, Protection has fixed the environmental discharge objectives set for applicable substances as its target by the end of SLV 2000 in 1998, thereby ensuring that all uses of the receiving environment are protected.

Based on SLV 2000 data for 1995, none of the eleven persistent and bioaccumulative substances were detected in the company's effluent.

PEEP TOXICITY REDUCTION

Low toxicity

The Potential Ecotoxic Effects Probe, or PEEP, combines the results of six standardized bioassays measuring the toxic effects of effluent. The results are expressed on a logarithmic scale of increasing toxicity ranging from 1 to 10 and are used to monitor discharge trends over the years. In the case of EKA CHIMIE CANADA INC. plant, a series of bioassays was conducted in 1995; yielding a PEEP index of 2,2, and showing a low toxicity for the organisms tested.

REDUCTION IN SUBSTANCES MONITORED

Load reduction in 1997

Based on company data for the first six months of 1997, the plant discharged 25 825 m^3/d of effluent, containing notably:

- 4200 kg/d of dissolved solids (DS)
- <50 kg/d of suspended solids (SS)
- <0,004 kg/d of chlorates

From 1993 to 1997, dissolved solids and chlorates decreased despite an increase in production and flowrate.

KEY POINTS

- **Recirculation of industrial wastewater and connection to municipal sewer system**
- **Negative Chimiotox index**

Information revised January 1998

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INDUSTRIAL PLANTS

Highlights

FACT SHEET 68

Général Motors du Canada Ltée

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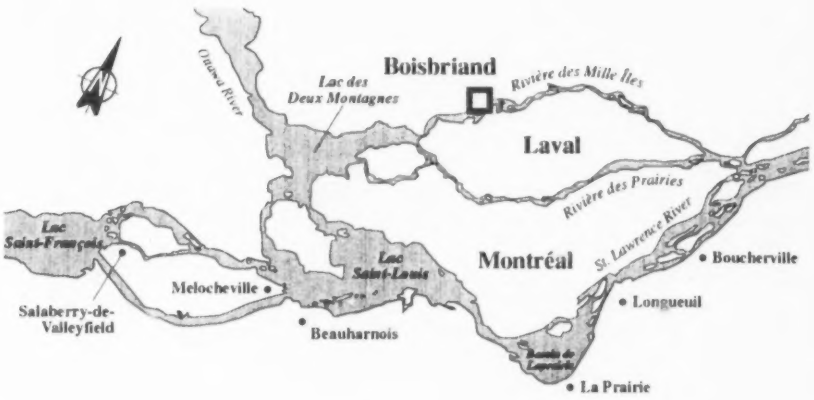
J7E 4K6



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The 106 industrial plants designated under SLV 2000 are divided into four groups, each with a specific objective. The GÉNÉRAL MOTORS DU CANADA LTÉE plant in Boisbriand is in Group 2, comprising plants that have already implemented treatment programs but whose effluent may contain toxic substances.

The objective for Group 2 is maximum reduction of toxic effluent of targeted plants.

INDUSTRIAL PLANT

Automobile assembly

The GÉNÉRAL MOTORS DU CANADA LTÉE plant in Boisbriand assembles cars. The bodies and plastic components are first cleaned with an alkaline solution to remove oil, grease and dust. Phosphatizing protects the metal from corrosion and improves the adherence of paint primer. The base coat consists of a water dispersion enamel while the clear coating is a water solution enamel; both are thermosetting paints. Tightness tests are carried out on the vehicles. In 1997, the plant had a work force of 1800.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Metal parts
- Alkaline cleaners
- Nitric acid solutions
- Nickel salts
- Acids (phosphoric, hydrochloric, chromic, acetic and lactic)
- Phenolic and vinyl resins
- Resin solutions (epoxy and urethane)
- Inorganic pigments
- Sealers
- Lubricating oils
- Gasoline
- Antifreeze
- SUVA coolants
- Zinc phosphate
- Sodium nitrite
- Sodium hydroxide solution
- Paint paste
- Neutralizers
- Biocides and disinfectants
- Urea formaldehyde resin
- Butylcellosolve
- Surfactants

FINISHED PRODUCT

- Cars (Camaro and Firebird)

Saint-Laurent

INDUSTRIAL PLANTS
Highlights

FACT SHEET 68

Général Motors du Canada Ltée

2500 Grande-Allée Street
Boisbriand, Quebec
J7E 4K6

***A** list of 106 industrial plants has been established under St. Lawrence Vision 2000 (SLV 2000), the second phase of the St. Lawrence Action Plan, launched in 1988. The general objective is to reduce toxic effluent and virtually eliminate discharges of persistent toxic substances.*

The 106 industrial plants designated under SLV 2000 are divided into four groups, each with a specific objective. The GENERAL MOTORS DU CANADA LTÉE plant in Boisbriand is in Group 2, comprising plants that have already implemented treatment programs but whose effluent may contain toxic substances.

The objective for Group 2 is maximum reduction of toxic effluent of targeted plants.

INDUSTRIAL PLANT

Automobile assembly

The GENERAL MOTORS DU CANADA LTÉE plant in Boisbriand assembles cars. The bodies and plastic components are first cleaned with an alkaline solution to remove oil, grease and dust. Phosphatizing protects the metal from corrosion and improves the adherence of paint primer. The base coat consists of a water dispersion enamel while the clear coating is a water solution enamel; both are thermosetting paints. Tightness tests are carried out on the vehicles. In 1997, the plant had a work force of 1800.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Metal parts
- Alkaline cleaners
- Nitric acid solutions
- Nickel salts
- Acids (phosphoric, hydrochloric, chromic, acetic and lactic)
- Phenolic and vinyl resins
- Resin solutions (epoxy and urethane)
- Inorganic pigments
- Sealers
- Lubricating oils
- Gasoline
- Antifreeze
- SUVA coolants
- Zinc phosphate
- Sodium nitrite
- Sodium hydroxide solution
- Paint paste
- Neutralizers
- Biocides and disinfectants
- Urea formaldehyde resin
- Butylcellosolve
- Surfactants

FINISHED PRODUCT

- Cars (Camaro and Firebird)

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

Mainly COD

According to company data, in 1993 the paint shop water treatment system discharged 835 m^3/d of effluent, containing notably:

- 286 kg/d of chemical oxygen demand (COD)
- 42 kg/d of suspended solids (SS)
- 17.4 kg/d of biochemical oxygen demand (BOD_5)
- 1.7 kg/d of oil and grease (O&G)
- 0.69 kg/d of metals (nickel, iron, copper, zinc, chromium, lead and titanium)

RESOURCES AND USES TO PRESERVE

Live-bait fishing

The GÉNÉRAL MOTORS DU CANADA LTÉE plant in Boisbriand is in the drainage basin of the Cachée River. The plant grounds are drained by Delisle and Juteau creeks, tributaries of this river. The area downstream from the discharge point is home to many species of live bait as well as muskrats and birds. Five species of minnow inhabit the area: white sucker, mud minnow, brook stickleback, creek chub and blackhead minnow. The minnows are important because they are harvested as live bait and sold in the Montreal area; they are also prey for certain fish that attract sport fishermen. There are also mallards in the region. Rosemère, Bois-des-Fillions, Lorraine and part of Terrebonne draw drinking water from the Milles-Îles River downstream from the mouth of the Cachée River.

ENVIRONMENTAL DISCHARGE OBJECTIVES

Environmental protection

Environmental discharge objectives are established to preserve local resources and uses. These guidelines, expressed as maximum permissible loads and concentrations for effluent released into the environment, are used in choosing treatment methods which best promote environmental protection. Environmental discharge objectives for the GÉNÉRAL MOTORS DU CANADA LTÉE plant are available on request.

EFFLUENT TREATMENT

Physico-chemical treatment

Wastewater from cleaning and preparing car body surfaces as well as some of the industrial wastewater undergoes physico-chemical treatment. The system comprises a storage basin, an emergency basin, four heavy metal electrodeposition cells, a lamellar clarifier that eliminates metal hydroxides, an alum addition system to precipitate phosphates, a lamellar clarifier to eliminate phosphates, two sand filters and two filter presses. Industrial wastewater comprising anolyte solution and effluents from deglazing and tightness testing is combined with domestic sewage and discharged into the Boisbriand public sewer system. Wastewater from the cafeterias is passed through oil separators before joining the rest of the domestic sewage. Wastewater from regenerating demineralization resins is neutralized and then discharged into the stormwater system together with roof drainage, surface water and runoff water.

PREVENTION AND CLEANUP MEASURES IMPLEMENTED

Raw material substitution and changes in treatment

A certificate of authorization to substitute three chemicals used in the phosphatizing operations was issued in April 1994; the purpose of the change was to reduce biochemical oxygen demand at source.

The company also made changes in May 1996 to discharge water with high loads of BOD_5 from the electrophoresis process to the municipal sewage treatment plant.

REGULATORY COMPLIANCE - WATER COMPONENT

Sewer discharge standards and certificate of authorization

The GÉNÉRAL MOTORS DU CANADA LTÉE plant is subject to standards for discharges to the Boisbriand sewer system and those in its certificate of authorization. The company is subject to a standard of 30 mg/L of BOD_5 for its discharges to the stormwater sewer. Since the company made changes, the process effluent standard has almost never been exceeded and the company is considering other related projects.

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

Mainly oil and grease

The Chimiotox index gauges the load of all toxic substances in industrial effluent using toxicity factors assigned to each contaminant. It is used, among other things, to monitor discharge trends over the years (Figure 1)and determine the toxic contribution of each pollutant (Table 1).

Table 1 gives SLV 2000 characterization data collected in May 1996 along with Chimiotox values estimated from them, assuming an effluent flowrate of 1505 m^3/d. Sixteen substances were selected in testing for more than 120. Based on these data, total oil and grease account for 87% of the Chimiotox index.

Figure 1 is plotted from SLV 2000 characterization data collected in 1996. The Chimiotox index calculated from these data was reported unchanged for 1993 to 1998. Treatment of effluent (domestic sewage and some industrial wastewater) at the municipal wastewater treatment plant is producing an additional decrease in the Chimiotox index that has not been quantified and does not appear in the figure.

Table 1 ***Chimiotox Index (1996) - Général Motors du Canada Ltée****

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
Total oil and grease	9.100	100	910
Total phosphorus	1.096	50	55
Total sulphides	0.079	500	39
Total lead	0.034	314	11
Total copper	0.019	451	8
Total mercury	0.00004	166 667	7
Total silver	0.001	10 000	6
Total iron	1.136	3.3	4
Total zinc	0.254	9.4	2
Total aluminum	0.142	11	2
Ammonia nitrogen	1.900	0.8	2
Total chromium	0.001	500	1
Total manganese	0.025	10	<1
Total molybdenum	0.099	1	<1
Nitrites-nitrates	0.0002	5	<1
Total nickel	0.0001	10	<1
CHIMIOTOX INDEX			**1 046**

*Assuming an effluent flowrate of 1505 m^3/d. (16 substances selected in testing for more than 120).

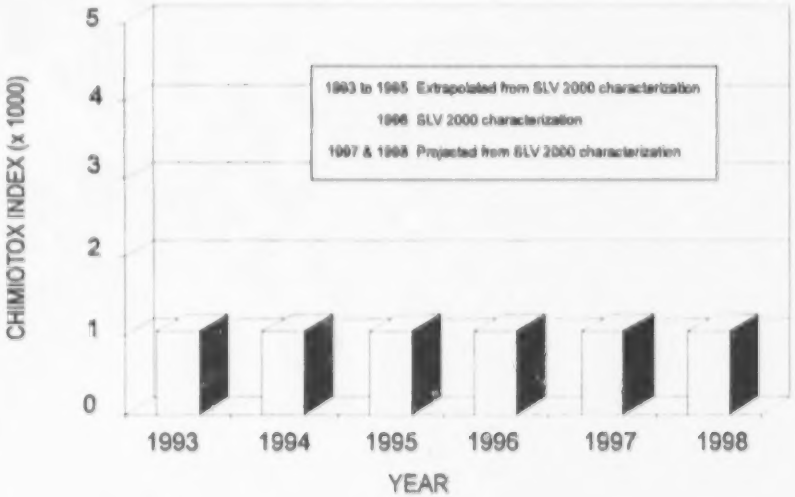

Figure 1 ***Chimiotox Index Trends (1993 - 1998) Général Motors du Canada Ltée***

VIRTUAL ELIMINATION OF PERSISTENT TOXIC SUBSTANCES

One long-range objective of SLV 2000 is the virtual elimination of eleven persistent and bioaccumulative toxic substances from the effluent of the 106 priority plants along the St. Lawrence and its tributaries. The targeted substances are those designated by the International Joint Commission in August 1993: PCBs, DDT, dieldrin, toxaphene, dioxins, furans, mirex, mercury, lead alkyls, benzo(*a*)pyrene and hexachlorobenzene. To reach this objective, Protection has fixed the environmental discharge objectives set for applicable substances as its target by the end of SLV 2000 in 1998, thereby ensuring that all uses of the receiving environment are protected.

The 1996 SLV 2000 characterization detected the presence of one of the eleven persistent toxic substances, mercury, in one of the company's three effluents. The concentration measured (0.7µg/L) is greater than the environmental discharge objective temporarily calculated for this substance (0.1 µg/L).

PEEP TOXICITY REDUCTION

Low toxicity

The Potential Ecotoxic Effects Probe (PEEP) combines the results of six standardized bioassays measuring the toxic effects of effluent. The results are expressed on a logarithmic scale of increasing toxicity ranging from 1 to 10 and are used to monitor discharge trends over the years. In the case of the GÉNÉRAL MOTORS DU CANADA LTÉE, a series of bioassays was carried out in 1996, yielding a PEEP of 2.7, and showing low toxicity for the organisms tested.

REDUCTION IN SUBSTANCES MONITORED

Reduction in several loads

According to company data, in 1997 the paint shop water treatment system discharged an average of 571 m^3/d of effluent, containing notably:

- 79.5 kg/d of chemical oxygen demand (COD)
- 4.0 kg/d of suspended solids (SS)
- 12.5 kg/d of biochemical oxygen demand (BOD_5)
- 2.1 kg/d of oil and grease (O&G)
- 0.38 kg/d of metals (nickel, iron, copper, zinc, chromium, lead, and titanium)

Between 1993 and 1997, the COD and BOD_5 decreased by 72% and 28% respectively and SS and metal loads also dropped by 90% and 45%. Oil and grease increased by 24% over the same period. The reductions are attributable to changes made by the company.

KEY POINTS

- **Measures taken under a certificate of authorization (April 1994) to reduce BOD_5 at source**
- **In 1996, segregation of the electrophoresis process effluent with BOD_5 load to the municipal wastewater treatment plant**
- **More than 60% reduction at source of a non-ionic surfactant**
- **Additional reduction of Chimiotox index at the municipal wastewater treatment plant**

Information updated January 1998

ADDITIONAL INFORMATION

Chimiotox Index and PEEP:
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Gouvernement du Québec
Ministère de l'Environnement et de la Faune

Saint-Laurent Vision 2000

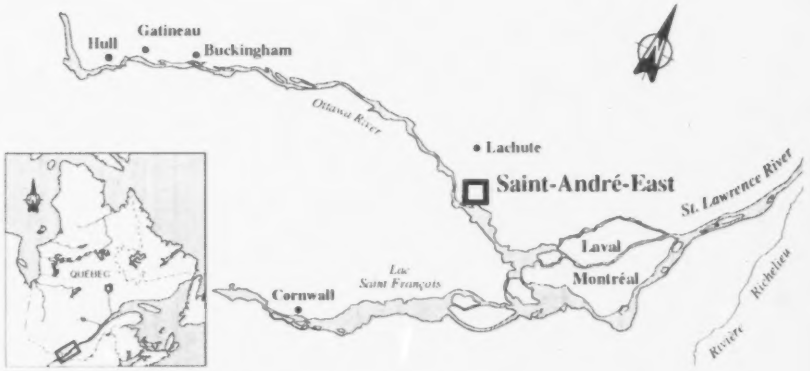
INDUSTRIAL PLANTS

Highlights

FACT SHEET 69

Goodfellow Inc.

4 du Moulin Street
Saint-André-East, Quebec
J0V 1X0



A list of 106 industrial plants has been established under St. Lawrence Vision 2000 (SLV 2000), the second phase of the St. Lawrence Action Plan, launched in 1988. The overall objective is to reduce toxic effluent and virtually eliminate discharges of persistent toxic substances.

The 106 industrial plants designated under SLV 2000 are divided into four groups, each with a specific objective. The GOODFELLOW INC. plant in Saint-André-East is in Group 2, comprising plants that have already implemented treatment programs but whose effluent may contain toxic substances.

The objective for Group 2 is maximum reduction of toxic effluent of targeted plants.

INDUSTRIAL PLANT

Wood preservation

The GOODFELLOW INC. plant in Saint-André-East treats timber only. The pieces of wood are already sized and drilled when they arrive. Incisions are made in the wood to promote the penetration of solutions. The wood is then dried at 30° to 55° C. The ambient air is dehumidified with heat pumps then heated and reintroduced into the dryer. The wood achieves a humidity of 16 to 19% after two or three weeks of treatment. Next the preservative is applied - chromated copper arsenate or pentachlorophenol. In both cases, the wood is placed on carts and put in an autoclave. A vacuum is created for 20 to 60 minutes and then the autoclave is filled with preservatives and hydrostatic pressure is applied for anywhere from 30 minutes to 18 hours. The preservative is then removed and routed to tanks, and the wood is stored sloping on a drip frame. The plant also has a flame-retardant treatment process. Annual production capacity of the plant is 14 200 t. In 1997, the plant operated at 65% capacity and employed a work force of 26.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Resinous timber
- Chromated copper arsenate (CCA - 50%)
- Pentachlorophenol (PCP - 98%)
- PCP solvent
- Flame retardants

FINISHED PRODUCTS

- CCA-treated wood
- PCP-treated wood
- Fire retardant treated wood
- Untreated wood

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

No industrial effluent

According to company data, in 1993 the plant did not discharge any industrial effluent, only domestic sewage, rainwater and daily boiler blow down. However, rainwater was slightly contaminated by soil on the plant's grounds.

RESOURCES AND USES TO PRESERVE

Fishing and pleasure boating

The GOODFELLOW INC. plant in Saint-André-East is on the right bank of the du Nord River, about 5 km from its confluence with the St. Lawrence. Close to 38 species of fish inhabit the area. The wetlands of Fer à Cheval and Carillon bays offer favourable spawning and rearing areas for many species of fish. The area also provides nesting, feeding and brooding sites for waterfowl; 22 species of wild bird are found in the region. Certain spots are also suitable for the nesting of great blue heron and the survival of muskrat, river otter and mink. The du Nord River attracts sport fishermen and pleasure boaters. The first drinking water intake downstream of the plant is in Lac des Deux Montagnes and supplies the municipality of Deux-Montagnes.

ENVIRONMENTAL DISCHARGE OBJECTIVES

Environmental protection

Environmental discharge objectives are established to preserve local resources and uses. These guidelines, expressed as maximum permissible loads and concentrations for effluent released into the environment, are used in choosing treatment methods which best promote environmental protection. There are no environmental discharge objectives for GOODFELLOW INC. as the plant does not discharge any process water.

EFFLUENT TREATMENT

Closed circuit

The industrial wastewater is filtered and recirculated in a closed circuit within the plant process. Water extracted from the wood together with the filtrate is stored and then reused in the chromated copper arsenate treatment. Domestic sewage empties into a septic tank with a tile field. Rainwater and water extracted daily from the boiler are discharged into the du Nord River.

PREVENTION AND CLEANUP MEASURES IMPLEMENTED

No major changes

No major changes to the plant process or the wastewater treatment system have been made at the GOODFELLOW INC. plant since 1993.

REGULATORY COMPLIANCE - WATER COMPONENT

No specific regulations

The GOODFELLOW INC. plant is not subject to any specific regulations governing effluents.

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

Mainly total arsenic

The Chimiotox index gauges the load of all toxic substances in industrial effluent using toxicity factors assigned to each contaminant. It is used, among other things, to monitor discharge trends over the years (Figure 1) and determine the toxic contribution of each pollutant (Table 1).

Table 1 gives SLV 2000 characterization data collected in October 1996 along with Chimiotox values estimated from them, assuming an effluent flowrate of 13.9 m^3/d. Twelve substances were selected in testing for more than 120. Based on these data, total arsenic accounts for 78% of the Chimiotox index.

Figure 1 is plotted from SLV 2000 characterization data colected in 1996. The Chimiotox index calculated from these data was reported unchanged for 1993 to 1998. No major changes were made to the company's processes between 1993 and 1998.

Table 1 ***Chimiotox Index (1996)- Goodfellow Inc.****

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
Total arsenic	0,006	57 143	349
2,3,7,8-T_4CDD equivalent	$6,3 \times 10^{-10}$	7×10^{10}	45
Total oil and grease	0,019	100	2
Total chromium	0,003	500	2
Total phosphorus	0,010	50	1
Total sulphides	0,002	500	1
Total aluminium	0,052	11	1
Total copper	0,002	451	1
Ammonia nitrogen	0,070	0,8	<1
Total iron	0,064	3,3	<1
Total manganese	0,002	10	<1
Total zinc	0,004	9,4	<1
CHIMIOTOX INDEX			**449**

*Assuming an effluent flowrate of 13.9 m^3/d (12 substances selected in testing for more than 120).

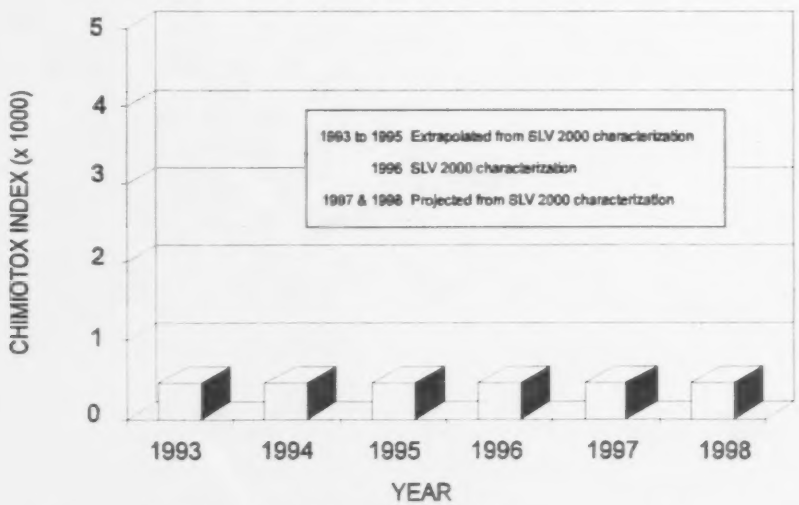


Figure 1 ***Chimiotox Index Trends (1993 - 1998) Goodfellow Inc.***

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The 1996 characterization detected dioxins and furans in the company's rainwater. The concentration measured was 16.15 pg/L 2,3,7,8-T_4CDD toxic equivalent. There are no environmental discharge objectives for this plant.

PEEP TOXICITY REDUCTION

Low toxicity

The Potential Ecotoxic Effects Probe (PEEP) combines the results of six standardized bioassays measuring the toxic effects of effluent. The results are expressed on a logarithmic scale of increasing toxicity ranging from 1 to 10 and are used to monitor discharge trends over the years. In the case of the GOODFELLOW INC. plant in Saint-André-East, a series of bioassays was carried out during the 1996 characterization, yielding a PEEP of 0.5, and showing low toxicity for the organisms tested.

REDUCTION IN SUBSTANCES MONITORED

No industrial effluent discharged

According to company data, in 1998 the plant does not discharge any process water; all industrial wastewater is recirculated. The plant discharges only domestic sewage, rainwater and water boiler extraction. However, rainwater is slightly contaminated by soil on the plant's grounds.

KEY POINTS

- **No process wastewater discharged**
- **Low toxicity**

Information updated January 1998

ADDITIONAL INFORMATION

Chimiotox Index and PEEP:
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